



PUBLIC ROADS

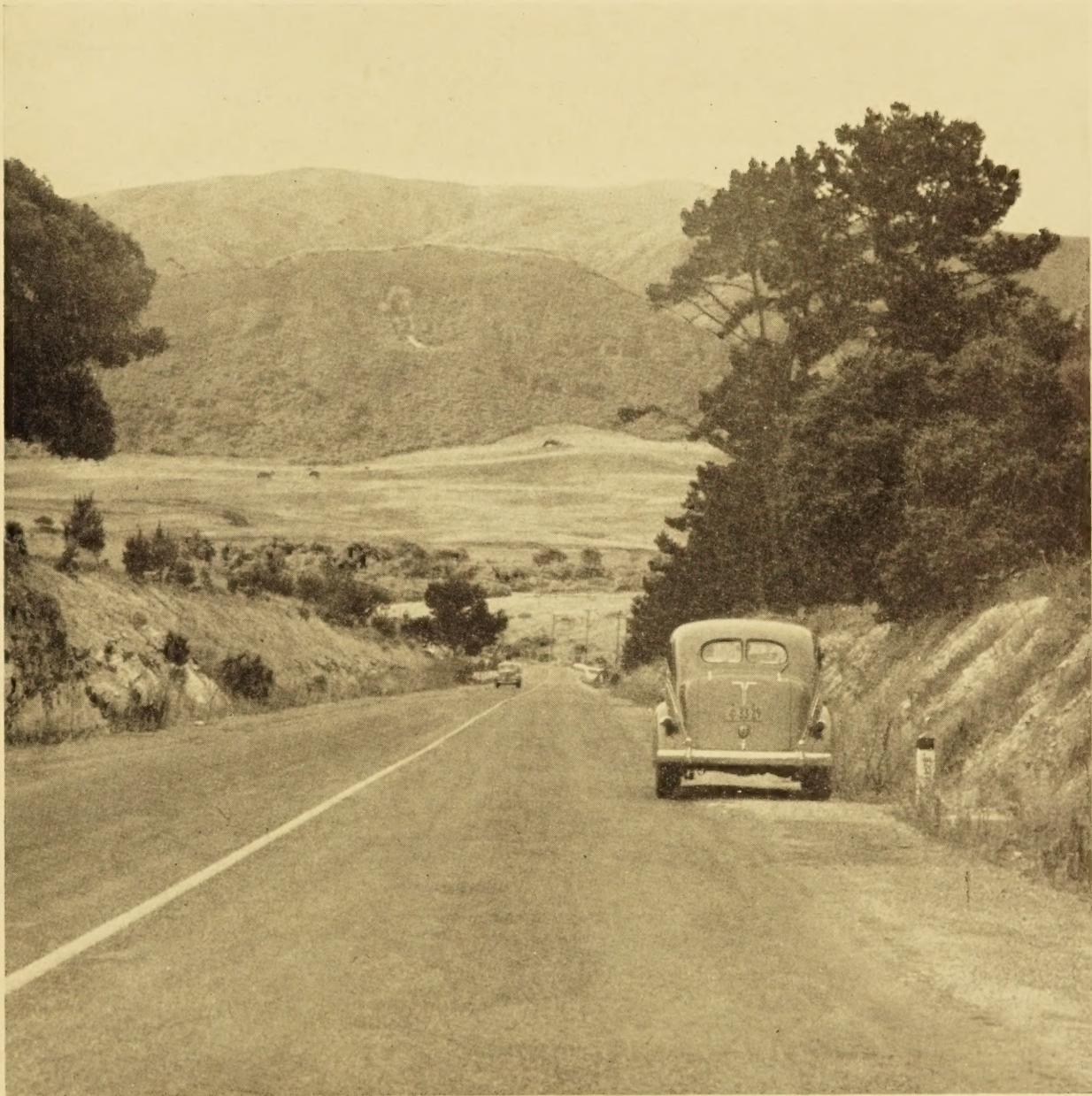
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PUBLIC ROADS

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D. M. BEACH, *Editor*

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The reports of research published in this magazine are necessarily qualified by the conditions of the tests from which the data are obtained. Whenever it is deemed possible to do so, generalizations are drawn from the results of the tests; and, unless this is done, the conclusions formulated must be considered as specifically pertinent only to described conditions.

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DISTRIBUTION OF MOTOR-VEHICLE REGISTRATIONS AND TAX PAYMENTS BY REGIONS AND POPULATION GROUPS

BY THE DIVISION OF CONTROL, PUBLIC ROADS ADMINISTRATION

Reported by RALPH S. LEWIS, Associate Highway Engineer-Economist and HOMER L. BAKER, Associate Transportation Economist

SINCE 1921 the Public Roads Administration has been collecting from the States and publishing in the form of annual statistical tables data on motor-vehicle registrations, motor-vehicle registration fees, and motor-fuel taxes for the individual States.¹ Until very recently these data were available for areas smaller than the State in only a few instances; but with a growing interest in highway problems there came a realization of the usefulness of such data in connection with highway administrative and legislative programs, and with the initiation in 1935 of the State-wide highway planning surveys there came a means of obtaining these more detailed data.²

Fundamentally, the highway planning surveys are a series of related fact-finding studies with the common purpose of taking stock of the physical aspects of our present highway plant, finding out how it is being used, examining its financing, and seeing how it fits economically into the national transportation picture. It is the purpose of this report to present for the various rural and urban areas of the several States data on motor-vehicle registrations, motor-vehicle registration fees, and motor-fuel taxes, data that are now available for the first time as a result of the planning surveys.

One of the financial studies of the highway planning surveys, the motor-vehicle allocation study, was devised to obtain such information relative to motor-vehicle registrations and fees and motor-fuel tax payments beyond or in addition to the data that may be obtained from records regularly kept by the State. As its name implies, the motor-vehicle allocation study has as its primary purpose the collection and analysis of information concerning the geographical distribution or location of all classes of motor vehicles in a particular State, together with the corresponding motor-vehicle registration fees and motor-fuel taxes paid by their owners. In practically all States records of total motor-vehicle registrations, motor-vehicle registration fees, and motor-fuel taxes for each of the several classes of motor vehicles are readily available, but in no State are similar records for the various rural and urban areas within the State available.

It was intended that these data as determined by the motor-vehicle allocation study would be available for use, together with other data obtained in the surveys, in connection with setting up equitable bases for obtaining the necessary highway funds in a particular State and for apportioning those funds among the several classes of roads in the State. Since it is difficult to foresee exactly what types of information will be required for such an undertaking, a considerable amount of supplemental information was obtained.

This supplemental information was in addition to the primary information relative to the location of motor vehicles and corresponding motor-vehicle registration fees and motor-fuel tax payments, and included data on year model or age, weight, capacity, and, in some cases, owner's occupation. The information obtained was in general the same for each of the States in which the motor-vehicle allocation studies were conducted.

DATA OBTAINED BY MEANS OF QUESTIONNAIRES

The data for the motor-vehicle allocation study were collected by means of questionnaires which were mailed or otherwise distributed to vehicle owners in each of the States in which the surveys were conducted. Approximately 3,300,000 of these questionnaires were completed and returned by motor-vehicle owners to the several planning survey organizations. The motor-vehicle owner was requested in every case to designate the county and also the name of the city, town, or rural district in which he resided. The vehicle description that was requested included the year of manufacture or year model, the passenger capacity of passenger cars and busses, and the carrying capacity of trucks. In some States the body type of all vehicles was requested, and if licensing practices were dependent upon such characteristics as empty weight or gross load, these data were also requested. In those States which did not have a flat rate registration fee the amount of the registration fee paid was also requested on the questionnaire. Finally, the vehicle owner was asked to make a statement of the number of miles driven during the year within the State of residence and in other States and of the average miles traveled per gallon of gasoline used, and to indicate whether these mileage and gasoline consumption data were based upon actual records or estimates.

The motor-vehicle allocation study data at this point represent only those vehicles whose owners completed and returned questionnaires. In order to prepare tabulations representing total motor-vehicle registrations, total motor-vehicle registration fees, and total motor-fuel tax receipts, these data were expanded statistically to give the required distributions of these known totals which were available from State records. Because annual mileage is related generally to the age of the vehicle, one of the most important control factors in connection with the expansion of annual mileages and gasoline consumptions and the subsequent determination of average annual mileages and average gasoline consumptions was that of year model. The motor-vehicle departments and related agencies supplied the basic data on total motor-vehicle registrations, total motor-vehicle registration fees, and total motor-fuel taxes in each State and the year-model control data were obtained in most cases from an analysis of the State registration records made for that particular

¹ The tables here referred to are MV-1, State motor-vehicle registrations; MV-2, State motor-vehicle receipts; and G-1, State motor-fuel tax receipts.

² The first highway planning survey was undertaken in Pennsylvania, in November 1935, and since that time the surveys have been undertaken in all States, the District of Columbia, and Hawaii.



FIGURE 1.—GROUPING OF STATES BY REGIONS.

purpose. The data obtained from the questionnaires were correlated with these data and expanded by individual year models for each of the several rural and urban areas within the State.

Approximately one questionnaire in every five indicated that the mileage and gasoline consumption data were based on records rather than estimates. The questionnaires based on records reported on the average considerably higher annual mileages than those based on estimates, as would be expected in view of the fact that those owners who keep records are in a majority of cases salesmen and other high mileage drivers who are required to keep records. The indicated miles traveled per gallon of gasoline used, on the other hand, were approximately the same for both records and estimates. The questionnaires further indicated that owners of newer cars returned a considerably larger proportion of questionnaires, on the basis of relative registrations, than did the owners of older cars, and thus demonstrated a further reason for the year-model control.

The results of the motor-vehicle allocation studies are now available for all States except Connecticut, Massachusetts, New Jersey, Rhode Island, Mississippi, New York, and Delaware. In order to complete the present study and to present national averages, the data for these States were estimated on the basis of corresponding data from similar adjacent States. Complete or partial year-model data as of the year of the motor-vehicle allocation studies and based on analyses of registration records are available for all of the States except Delaware, Georgia, Iowa, Mississippi, New Jersey, New York, Ohio, Pennsylvania, Texas, and the District of Columbia.

All data collected for the motor-vehicle allocation studies have been summarized on a population-group basis, with a primary division between rural and urban areas and with urban areas further classified on a population basis, as follows:

Unincorporated areas	-----
Incorporated places having a population of—	-----
1,000 or less	-----
1,001-2,500	-----
2,501-5,000	-----
5,001-10,000	-----
10,001-25,000	-----
25,001-50,000	-----
50,001-100,000	-----
100,001-250,000	-----
250,001-500,000	-----
500,001-1,000,000	-----
Over 1,000,000	-----

This same grouping is used in the present study, and is

applicable to all States except Maine, New Hampshire, Massachusetts, and Rhode Island, where, because of the nature of local governmental units, no unincorporated areas exist, and all units are classified on the basis of total population. Vermont and Connecticut would ordinarily be included in this list of excepted States, all of which are in New England, but because of the existence of incorporated villages and cities in Vermont, and boroughs in Connecticut, it was possible for planning survey purposes and in this study to handle these two States on a basis similar to that existing in the majority of States.

Of particular use in connection with the present study are those tabulations of the motor-vehicle allocation data that indicate by population groups for each State the distribution of ownership of motor vehicles of each type, the amounts of motor-vehicle registration fees and motor-fuel taxes paid by the owners of these vehicles, the average annual mileages traveled by motor vehicles of each type, and finally the year-model distribution of these vehicles. The tabulations that indicate the distribution of ownership of motor vehicles and corresponding payments of motor-vehicle registration fees and motor-fuel taxes present data on private vehicles owned by residents, on private vehicles registered in the State but owned by nonresidents, on public vehicles and, in the case of motor-fuel taxes, on "foreign" vehicles (private vehicles not registered in the State). Data in this report, however, are limited to private vehicles of residents and nonresidents; data on foreign vehicles and on public vehicles are excluded.

DATA PRESENTED BY GEOGRAPHIC REGIONS

Since the primary emphasis is placed upon the differences existing between population groups rather than upon those existing between States, the study does not in general present data for individual States. There are, however, important regional differences that cannot be overlooked in the study, and for that reason the data are presented by geographic regions. The regional classification that has been selected is based upon economic and geographic characteristics of the States. This classification, which is shown in figure 1, was used in an earlier study of trends in motor-vehicle registrations and receipts.³ The regions, although few in number, are sufficient to show those important sectional differences that do not exist between individual States in the same section. In the case of the year model studies, complete data are available for only a relatively few States and it is not possible to present such data on a regional basis at this time.

The motor-vehicle allocation studies were carried on in most States for the registration year 1936, and the general method of the present study is to use the population group distributions of those studies for determining the population group distributions of motor-vehicle registrations and fees and motor-fuel taxes for the year 1939. The basic control data used in the study were provided by the Public Roads Administration's annual statistical tables for 1939. Data from these tables were allocated to population groups on the basis of the individual motor-vehicle allocation studies, so that the final results represent the best possible distributions of the latest available control data.

³ Significant Trends in Motor-Vehicle Registrations and Receipts, by Robert H. Paddock. PUBLIC ROADS, Vol. 20, No. 8, October 1939.

Although shifts in population and other factors may, over a period of years, change to an appreciable extent the relative distribution of motor vehicles in a particular area, it is believed that a shift of population or other change over a period of approximately 3 years and within a region as large as those selected for this study would not significantly alter the basic distribution.

Only the 31,925,791 private and commercial vehicles registered in 1939 have been considered in this study. Publicly owned vehicles, which totaled 416,996 in 1939, have been excluded from consideration because they are not comparable with privately owned vehicles insofar as the payment of highway-user taxes is concerned.

A variety of practices exists in the registration of vehicles owned by the Federal and State Governments and by the counties and local units of government. Vehicles owned by the Federal Government are, in general, exempt from the payment of registration fees and from State motor-fuel taxes. However, some States require vehicles owned by the Federal Government to be registered although no fee is charged. In other States these vehicles are required to carry license plates for which nominal fees are charged. Some Federal agencies request regular license plates to be used on their vehicles instead of the official license plates of the Federal Government. In most States these plates are furnished without charge but in others nominal fees are charged. The variety of practices followed results in some confusion in the registration records maintained by the States. A majority of the States have no records of the number of Federal vehicles in the State. A few States have a record of the number of vehicles and exclude them from the regular registration records.

Motor vehicles owned by the State, counties, and local governmental units are excluded from this study in all but six States. In most States special classifications are maintained for these publicly owned vehicles and they are usually subject to special rates or are registered free of charge. However, it is not possible to segregate these vehicles from the privately owned vehicles in Colorado, Kansas, Massachusetts, Michigan, New Hampshire, and Vermont. Consequently, these publicly owned vehicles are included with the privately owned vehicles in the registration records and in the study.

Public Roads Administration table MV-1 for 1939 and the results of the motor-vehicle allocation studies for all available States were used as the basis for the preparation of table 1 showing the distribution of the four types of vehicles by regions and population groups. The registration records, as compiled by the State authorities and submitted to the Public Roads Administration, do not in all cases have the same classification as those used in the motor-vehicle studies. For example, busses and trucks are combined in one classification as commercial vehicles in Ohio and are not segregated in the official State registration records. When the motor-vehicle allocation study was conducted in Ohio for the year 1935 a special analysis of the registration records was made to determine the number of trucks and busses. Since the registration data for the year 1939 do not include a separation of these vehicle types the 1935 motor-vehicle allocation study data were used as the basis for estimating the number of busses included with trucks and other commercial vehicles in Ohio.

Revisions of this type were necessary in only a few instances. In other States, either because motor-vehicle allocation data are not available or a separation of trucks and busses is not made in the registration records, a complete segregation of vehicle types is not possible nor is it possible to make an estimate of the number of each type. Consequently, busses have been included with trucks in Delaware, Illinois, and Iowa and are so presented in table 1. The classification "other vehicles" includes all trailers and motorcycles in all cases.

BUS AND TRAILER INFORMATION INCOMPLETE

Because of wide variations in registration practices which affect in particular the registration of busses and trailers, it is difficult to present adequate and significant data concerning these vehicles. Accurate records of the registration of busses are not available for a large number of States. In general, only commercial busses are included in the official registration records supplied by the State authorities but in some instances school busses are included. In some States school busses are classed as publicly owned vehicles despite the fact that they may be privately owned and operated upon a contract basis. In other instances they are considered to be privately owned and subject to the same schedule of fees that the owners of other privately-owned vehicles pay. For these reasons the number of busses registered and the amounts of registration fees paid cannot be considered to be complete or entirely accurate.

Trailer registration regulations vary even more than those for busses. Some States require the registration of all trailers regardless of type, weight, or carrying capacity while others require only the registration of certain types of commercial or freight-carrying trailers. Because of the variations in practice it will be readily seen that the number of trailers reported as registered will not represent the number of trailers actually in existence. For this reason this study, while including all data reported, has placed major emphasis upon passenger cars and trucks for which it is believed adequate and accurate data are available. The operations of such vehicles also represent by far the major portion of traffic movement.

While the official State motor-vehicle registration records provide the data necessary for the preparation of State and regional figures, they do not provide the data relative to the number of vehicles registered in each of the population groups. In a few States records are maintained which would permit the direct tabulation of the number of vehicles owned in a particular city, town, or rural area. This is usually the case where motor-vehicle imposts are returned to the local governmental units on a basis that requires the number of vehicles registered in each local governmental unit to be determined. Since only a few States maintain these records, it was necessary to devise other procedures in order to determine the situs of ownership.

The motor-vehicle questionnaires, previously described, which were mailed to motor-vehicle owners throughout each of the States, were used as a basis for determining the distribution of vehicles by population group. It was necessary to devise a method of correcting the distortion in the returned sample caused by lack of uniform response by residents of the various population groups and the fact that owners of newer vehicles returned a larger proportion of questionnaires than did the owners of older vehicles.

TABLE 1.—Distribution of vehicles by population groups in 1939¹

Region	Unincorporated areas	Incorporated places having a population of—											All places	Non-resident	Total	
		1,000 or less	1,001 to 2,500	2,501 to 5,000	5,001 to 10,000	10,001 to 25,000	25,001 to 50,000	50,001 to 100,000	100,001 to 250,000	250,001 to 500,000	500,001 to 1,000,000	More than 1,000,000				
		Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number				Number
Northeast	1,336,053	173,821	316,019	386,719	430,333	808,322	608,230	475,547	562,681	392,525	438,597	1,278,634	7,207,481	3,128	7,210,609	
Southeast	1,726,678	188,491	222,140	204,758	210,046	260,504	193,134	246,279	219,544	274,487	-----	-----	3,746,061	8,337	3,754,398	
Middle States	2,186,453	564,874	473,575	400,190	460,084	596,766	550,416	510,899	388,159	696,266	490,127	982,384	8,300,223	8,228	8,308,451	
Northwest	750,110	197,058	151,741	98,535	114,260	177,368	65,476	53,395	143,240	86,737	-----	-----	1,837,920	1,520	1,839,440	
Southwest	712,384	73,485	127,064	114,608	142,020	148,507	110,854	74,814	225,924	192,329	-----	-----	1,921,989	12,624	1,934,613	
Far West	784,533	66,630	102,575	129,689	172,459	266,508	163,803	225,977	184,314	283,014	164,619	536,026	3,080,147	6,385	3,086,532	
United States	7,496,241	1,264,359	1,393,114	1,334,499	1,529,202	2,257,975	1,691,913	1,586,911	1,723,862	1,925,358	1,093,343	2,797,044	26,093,821	40,222	26,134,043	
TRUCKS																
Northeast	226,945	35,863	56,134	52,224	57,330	107,571	72,536	74,299	80,518	55,466	70,339	194,454	1,083,679	3,990	1,087,669	
Southeast	385,567	44,063	49,734	45,520	42,765	53,206	34,590	46,086	36,824	45,005	-----	-----	783,360	10,316	793,676	
Middle States	348,330	111,610	82,844	61,651	65,184	77,712	67,123	55,671	46,714	85,420	70,119	109,092	1,181,470	4,377	1,185,847	
Northwest	197,224	43,300	31,514	19,600	20,806	29,497	10,874	8,033	21,642	11,353	-----	-----	393,843	3,082	396,925	
Southwest	203,024	18,715	36,009	33,240	35,343	36,522	24,523	15,039	38,912	34,190	-----	-----	475,517	10,867	486,384	
Far West	136,381	19,491	26,220	26,119	33,366	35,353	21,800	22,703	17,773	29,961	22,808	57,875	449,850	1,944	451,794	
United States	1,497,471	273,042	282,455	238,354	254,794	339,861	231,446	221,831	242,383	261,395	163,266	361,421	4,367,719	34,576	4,402,295	
BUSSES																
Northeast	580	425	977	955	1,403	3,348	4,385	1,994	4,297	2,426	1,160	4,078	26,028	2,446	28,474	
Southeast	7,263	1,243	928	614	643	1,755	849	2,170	1,106	1,853	-----	-----	18,424	1,225	19,649	
Middle States	924	326	195	195	233	324	664	542	465	1,483	1,455	323	7,129	547	7,676	
Northwest	1,068	348	207	158	149	403	189	68	575	236	-----	-----	3,401	384	3,785	
Southwest	317	18	36	181	240	455	511	179	2,125	524	-----	-----	4,586	415	5,001	
Far West	932	144	255	307	501	629	454	599	715	884	2,457	1,650	9,527	63	9,590	
United States	11,084	2,504	2,598	2,410	3,169	6,914	7,052	5,552	9,283	7,406	5,072	6,051	69,095	5,080	74,175	
OTHER VEHICLES																
Northeast	34,018	6,357	10,384	9,581	9,637	18,142	10,772	10,365	9,821	5,768	9,259	34,642	168,746	590	169,336	
Southeast	59,472	14,510	11,957	10,221	7,758	10,068	7,046	8,036	7,585	4,341	-----	-----	140,994	3,548	144,542	
Middle States	185,329	60,732	47,319	35,512	36,460	43,249	35,865	34,776	34,087	31,978	15,161	37,083	597,551	4,068	601,619	
Northwest	71,004	10,833	8,024	4,960	5,890	7,976	1,411	1,712	4,151	865	-----	-----	116,826	364	117,190	
Southwest	29,072	3,145	6,127	5,625	5,898	7,246	4,419	3,201	9,926	6,758	-----	-----	81,417	1,767	83,184	
Far West	52,582	7,224	13,029	14,095	20,278	18,037	12,035	14,353	8,935	10,032	6,514	22,083	199,197	210	199,407	
United States	431,477	102,801	96,840	79,994	85,921	104,718	71,548	72,443	74,505	59,742	30,934	93,808	1,304,731	10,547	1,315,278	
ALL VEHICLES																
Northeast	1,597,596	216,466	383,514	449,479	498,703	937,383	695,923	562,205	657,317	456,185	519,355	1,511,808	8,485,934	10,154	8,496,088	
Southeast	2,178,980	248,307	284,759	261,113	261,212	325,533	235,619	302,571	265,059	325,686	-----	-----	4,688,839	23,426	4,712,265	
Middle States	2,721,066	737,542	603,933	497,548	561,961	718,051	654,068	601,888	469,425	815,147	576,862	1,128,882	10,086,373	17,220	10,103,593	
Northwest	1,019,406	251,539	191,486	123,253	141,105	215,244	77,950	63,208	169,608	99,191	-----	-----	2,351,990	5,350	2,357,340	
Southwest	944,797	95,363	169,236	153,654	183,501	192,730	140,307	93,233	276,887	233,801	-----	-----	2,483,509	25,673	2,509,182	
Far West	974,428	93,489	142,079	170,210	226,504	320,527	198,092	263,632	211,737	323,891	196,398	617,634	3,738,721	8,602	3,747,323	
United States	9,436,273	1,642,706	1,775,007	1,655,257	1,873,086	2,709,468	2,001,959	1,886,737	2,050,033	2,253,901	1,292,615	3,258,324	31,835,366	90,425	31,925,791	

¹ Source: Public Roads Administration table MV-1, 1939. Planning survey data were used for population group distribution and adjustments in vehicle types.

The proper determination of the distribution of passenger cars by population groups, when the determination is to be made through the use of questionnaires, involves a study of the distribution of year models. The year model distribution, which was obtained for each State by either a complete or partial analysis of the registration records, was used in adjusting the returned sample to correct for the distortion caused by the lack of uniform response.

The basis for determining the number of vehicles of each type registered in each population group in 1939 was provided by the results of the motor-vehicle allocation studies, which were available for all but seven States. The distribution of vehicles by population groups as determined by the motor-vehicle allocation studies was applied directly to the total number of vehicles registered in each State in 1939.

In those States for which results of motor-vehicle allocation studies were not available the distribution of vehicles by population groups was estimated. The

distribution of vehicles in adjoining and nearby States having the same geographic and economic characteristics was used as the basis for making the estimates. Estimates of the vehicle distribution by population groups were made for Connecticut, Delaware, Massachusetts, Mississippi, New Jersey, New York, and Rhode Island.

In addition to the population group distribution a small number of vehicles in each region are designated as "nonresident" vehicles. These are vehicles registered in a State other than that of the residence of the owner. Some States require vehicles entering the State to register while others consider a bona fide registration in another State as meeting the local requirements. It is the practice of some corporations to pay all registration fees for vehicles from the home office of the corporation, which may be located in a State other than the one in which the vehicles are operated. In some States such registrations are considered as nonresident registrations and they are so considered in this study.

MIDDLE STATES HAVE NEARLY ONE-THIRD OF ALL PASSENGER CARS

The distribution of the four types of vehicles by regions and population groups is shown in table 1. The data given in this table for passenger cars and trucks are expressed in percentages in table 2. Passenger cars constitute the major part of the motor-vehicle registration with a total of 26,134,043, which is 81.8 percent of all vehicles registered. The 4,402,295 trucks constitute 13.8 percent of the total registration. Motor busses, trailers, and motorcycles make up a relatively small proportion of the total registration.

Approximately one-third of all the passenger cars in the United States were registered in the eight States comprising the Middle States region. The fact that the automobile industry is centered in this region is probably an important factor in the relatively high concentration of ownership in this area. The Northeast region ranked second in number of passenger cars with a total of 7,210,609 registrations. The Northwest region comprising nine States had the lowest total of the six regions with 1,839,440 passenger cars. Although the Middle States also had the largest registration of trucks, the ratio of passenger cars to trucks was higher than that of any other region. The 1,185,847 truck registrations accounted for 26.9 percent of the total truck registrations in the country while the passenger car registrations were 31.8 percent of the total. The Northeast region had the second largest truck registration with 1,087,669 vehicles while the Northwest had the lowest total with 396,925 registrations.

The distribution of motor vehicles, population, and land area of the six regions are compared in table 3. These data are presented graphically in figure 2. The densely populated Northeast region had 26.6 percent of the motor-vehicle registrations and only 5.8 percent of the land area of the country. The Northwest region with a total land area of 818,508 square miles, or 27.5 percent of the total area of the country, had only 7.4 percent of the total number of motor vehicles registered. The three Western regions as a group accounted for 27.0 percent of the motor vehicles registered in 1939 with only 20.1 percent of the population while the Middle States and the two Eastern regions had 73

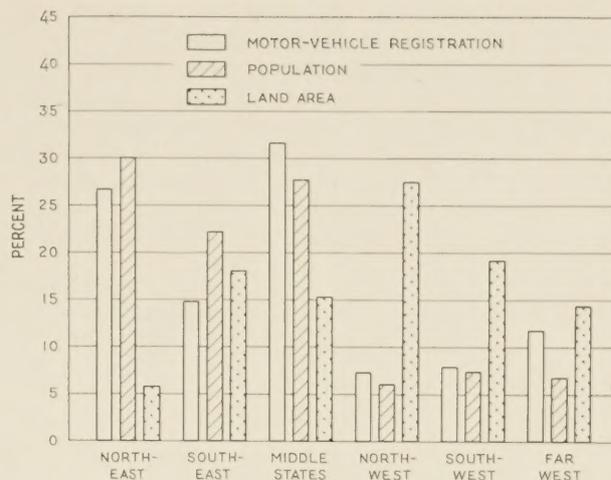


FIGURE 2.—PERCENTAGE DISTRIBUTION OF MOTOR VEHICLES REGISTERED IN 1939 AND POPULATION AND LAND AREA AS REPORTED BY THE 1930 CENSUS.

percent of the vehicles and 79.9 percent of the population. The three Western regions, while having a relatively high number of vehicles when compared with the Middle States and Eastern regions on a population basis have relatively few vehicles when compared with these regions on an area basis. The three Western regions had 61 percent of the land area but only 27 percent of the vehicle registrations.

The relatively high concentration of vehicles in the Northeast is evident in table 4 which shows the number of passenger cars, trucks, and all vehicles per square mile in each of the six regions. The average number of passenger cars per square mile in the Northeast was 41.4 and for the United States was 8.8. The Northwest had only 2.2 passenger cars per square mile of area.

Table 5 shows the ratio of passenger cars to trucks for each region and population group in 1939. The ratio of passenger cars to trucks for the United States was 6.0. There is considerable variation in the ratio throughout the various population groups and regions, ranging from 3.4 in places having a population of less than 1,000 in the Far West and in places having a population of

TABLE 2.—Percentage distribution of passenger cars and trucks by population groups in 1939

PASSENGER CARS

Region	Unincorporated areas	Incorporated places having a population of—											All places	Non-resident	Total
		1,000 or less	1,001 to 2,500	2,501 to 5,000	5,001 to 10,000	10,001 to 25,000	25,001 to 50,000	50,001 to 100,000	100,001 to 250,000	250,001 to 500,000	500,001 to 1,000,000	More than 1,000,000			
Northeast	18.5	2.4	4.4	5.4	6.0	11.2	8.4	6.6	7.8	5.4	6.1	17.7	99.9	0.1	100.0
Southeast	46.0	5.0	5.9	5.5	5.6	6.9	5.1	6.6	5.9	7.3	-----	-----	99.8	.2	100.0
Middle States	26.3	6.8	5.7	4.8	5.5	7.2	6.6	6.2	4.7	8.4	5.9	11.8	99.9	.1	100.0
Northwest	40.8	10.7	8.2	5.4	6.2	9.6	3.6	2.9	7.8	4.7	-----	-----	99.9	.1	100.0
Southwest	36.8	3.8	6.6	5.9	7.3	7.7	5.7	3.9	11.7	9.9	-----	-----	99.3	.7	100.0
Far West	25.4	2.2	3.3	4.2	5.6	8.6	5.3	7.3	6.0	9.2	5.3	17.4	99.8	.2	100.0
United States	28.7	4.8	5.3	5.1	5.8	8.6	6.5	6.1	6.6	7.4	4.2	10.7	99.8	.2	100.0

TRUCKS

Northeast	20.8	3.3	5.1	4.8	5.3	9.9	6.7	6.8	7.4	5.1	6.5	17.9	99.6	0.4	100.0
Southeast	48.6	5.5	6.3	5.7	5.4	6.7	4.4	5.8	4.6	5.7	-----	-----	98.7	1.3	100.0
Middle States	29.4	9.4	7.0	5.2	5.5	6.5	5.7	4.7	3.9	7.2	5.9	9.2	99.6	.4	100.0
Northwest	49.7	10.9	7.9	4.9	5.3	7.4	2.7	2.0	5.5	2.9	-----	-----	99.2	.8	100.0
Southwest	41.7	3.9	7.4	6.8	7.3	7.5	5.1	3.1	8.0	7.0	-----	-----	97.8	2.2	100.0
Far West	30.2	4.3	5.8	5.8	7.4	7.8	4.8	5.0	4.0	6.6	5.1	12.8	99.6	.4	100.0
United States	34.0	6.2	6.4	5.4	5.8	7.7	5.3	5.1	5.5	5.9	3.7	8.2	99.2	.8	100.0

2,501 to 5,000 in the Southwest region to 10.4 in places having a population of 100,001 to 250,000 in the Far West region. In the Southwest region there was one truck registered for every four passenger cars while in the Middle States there was only one truck for every seven passenger cars. The low ratio of passenger cars to trucks in the unincorporated areas and small incorporated places is probably due to the use of trucks for carrying passengers as well as for general hauling on farms.

TABLE 3.—Distribution of motor-vehicle registration, population, and land area in the United States

Region	1939 vehicle registration ¹		Population ²		Land area ²	
	Number	Percent	Number	Percent	Square miles	Percent
Northeast.....	8,496,088	26.6	36,783,866	30.0	173,944	5.8
Southeast.....	4,712,265	14.8	27,280,103	22.2	534,548	18.0
Middle States.....	10,103,593	31.6	33,961,444	27.7	450,735	15.2
Northwest.....	2,357,340	7.4	7,384,497	6.0	818,508	27.5
Southwest.....	2,509,182	7.9	9,079,645	7.4	568,125	19.1
Far West.....	3,747,323	11.7	8,285,491	6.7	427,916	14.4
United States.....	31,925,791	100.0	122,775,046	100.0	2,973,776	100.0

¹ Includes all registered motor vehicles, trailers, and motorcycles.
² Source: 1930 Census.

TABLE 4.—Motor vehicles registered per square mile in the United States in 1939

Region	Passenger cars	Trucks	All vehicles ¹
Northeast.....	41.4	6.2	48.8
Southeast.....	7.0	1.5	8.8
Middle States.....	18.4	2.6	22.1
Northwest.....	2.2	.5	2.9
Southwest.....	3.4	.8	4.4
Far West.....	7.2	1.1	8.8
United States.....	8.8	1.5	10.7

¹ Includes busses, trailers, and motorcycles.

TABLE 5.—Ratio of passenger cars to trucks in 1939, by regions and population groups

Population group	Region						
	North-east	South-east	Middle States	North-west	South-west	Far West	All re-gions
Unincorporated areas.....	5.9	4.5	6.3	3.8	3.5	5.8	5.0
Incorporated places having a population of—							
Less than 1,000.....	4.8	4.3	5.1	4.6	3.9	3.4	4.6
1,001 to 2,500.....	5.6	4.5	5.7	4.8	3.5	3.9	4.9
2,501 to 5,000.....	7.4	4.5	6.5	5.0	3.4	5.0	5.6
5,001 to 10,000.....	7.5	4.9	7.0	5.5	4.0	5.2	6.0
10,001 to 25,000.....	7.5	4.9	7.7	6.0	4.1	7.5	6.6
25,001 to 50,000.....	8.4	5.6	8.2	6.0	4.5	7.5	7.3
50,001 to 100,000.....	6.4	5.3	9.2	6.6	5.0	10.0	7.2
100,001 to 250,000.....	7.0	6.0	8.3	6.6	5.8	10.4	7.1
250,001 to 500,000.....	7.1	6.1	8.2	7.6	5.6	9.4	7.4
500,001 to 1,000,000.....	6.2	-----	7.0	-----	-----	7.2	6.7
More than 1,000,000.....	6.6	-----	9.0	-----	-----	9.3	7.7
Total.....	6.6	4.8	7.0	4.7	4.0	6.8	6.0

THREE-TENTHS OF ALL VEHICLES OWNED BY RESIDENTS OF UNINCORPORATED PLACES

Of the 31,925,791 vehicles registered in 1939, persons residing in unincorporated areas owned 9,436,273 or 29.6 percent. Residents of incorporated places having a population of less than 1,000 owned 1,642,706 vehicles while 1,775,007 were owned in places having a population of 1,001 to 2,500. The residents of these three population groups, which include 43.6 percent of

the total population of the country, owned 40.2 percent of the registered vehicles. However, the percentage of vehicles owned in the two smallest classes of incorporated places which include all those places having a population of less than 2,500 persons, exceeds the percentage of population residing in these two groups. Of the total population of the country, 8.1 percent resided in these groups while 10.6 percent of the vehicles were owned by these residents. Table 6 gives a comparison of population and motor-vehicle distribution expressed in percentages for each of the several population groups. The residents of unincorporated areas and cities having a population of more than 500,000 persons own fewer vehicles in proportion to the population in these groups than do residents of incorporated places that have a population of less than 500,000. A total of 17,848,154 vehicles were registered by owners residing in incorporated places having a population of less than 500,000. These latter population groups accounted for 47.5 percent of the population of the United States and 55.9 percent of the vehicles registered.

TABLE 6.—Comparison of population and motor-vehicle distribution expressed in percentages for the several population groups

Population group	Per-centage of pop-ulation	Percentage of motor vehicles registered				
		Pas-senger cars	Trucks	Busses	Other vehicles	Total
Unincorporated areas.....	35.5	28.7	34.0	14.9	32.8	29.6
Incorporated places having a population of—						
Less than 1,000.....	3.8	4.8	6.2	3.4	7.8	5.1
1,001 to 2,500.....	4.3	5.3	6.4	3.5	7.4	5.5
2,501 to 5,000.....	4.1	5.1	5.4	3.3	6.1	5.2
5,001 to 10,000.....	4.9	5.8	5.8	4.3	6.5	5.9
10,001 to 25,000.....	7.4	8.6	7.7	9.3	8.0	8.5
25,001 to 50,000.....	5.2	6.5	5.3	9.5	5.4	6.3
50,001 to 100,000.....	5.3	6.1	5.1	7.5	5.5	5.9
100,001 to 250,000.....	6.1	6.6	5.5	12.5	5.7	6.4
250,001 to 500,000.....	6.4	7.4	5.9	10.0	4.5	7.1
500,001 to 1,000,000.....	4.7	4.2	3.7	6.8	2.4	4.0
More than 1,000,000.....	12.3	10.7	8.2	8.2	7.1	10.2
Nonresident.....	-----	.2	.8	6.8	.8	.3
Total.....	100.0	100.0	100.0	100.0	100.0	100.0

The number of passenger cars registered per 100 persons living in each of the population groups is shown in table 7. There is considerable range in passenger car ownership per 100 persons in the several regions and population groups. In the Far West in incorporated places having a population of 50,001 to 100,000 there were 53.2 passenger cars per 100 persons while in the unincorporated areas of the Southeast there were only 10.2 cars per 100 persons. The unincorporated areas in the Northeast were above the average of 19.6 for the entire region with 21.7 passenger cars per 100 persons.

The comparatively small number of passenger cars owned per 100 persons in the larger cities is undoubtedly due in part to the extensive and efficient public transportation systems which make it unnecessary for many persons residing in those places to depend upon the automobile for local transportation. Lack of highly developed public transportation facilities in the smaller cities makes the ownership of an automobile almost a necessity under ordinary circumstances. Furthermore, the ownership of vehicles in the larger cities is considerably more expensive than it is in the smaller places due to higher operating costs and costs of storage and parking facilities.⁴ These factors are reflected in the

⁴ Family Expenditures in Selected Cities, 1935-36, Vol. VI, U. S. Department of Labor, Bureau of Labor Statistics.

lower ratio of passenger cars to population in cities over 500,000.

While the necessity for some means of local transportation is probably greater in the unincorporated areas than in the smaller cities, the low cash income of residents of these areas in many cases precludes the ownership of any kind of a motor vehicle. This is particularly true in the Southeast where in the unincorporated areas there were only 10.2 passenger cars registered per 100 persons and in the Southwest where the number registered per 100 persons was 14.8. The lack of passenger cars in the unincorporated areas is offset to some extent by a relatively large truck registration in all but the Southeast and Southwest regions.

TABLE 7.—Number of passenger cars registered per 100 persons¹

Population group	Region						United States
	North-east	South-east	Middle States	North-west	South-west	Far West	
Unincorporated areas	21.7	10.2	22.2	21.5	14.8	33.5	17.2
Incorporated places having a population of—							
Less than 1,000	24.1	18.1	33.6	27.2	24.5	45.0	27.4
1,001 to 2,500	25.0	19.0	30.9	27.9	25.7	42.6	26.6
2,501 to 5,000	25.5	19.4	29.8	28.2	26.2	40.9	26.6
5,001 to 10,000	21.6	21.0	27.9	29.7	26.0	39.5	25.4
10,001 to 25,000	21.6	19.6	26.2	29.7	30.7	43.6	25.0
25,001 to 50,000	25.3	21.8	26.2	28.4	31.2	38.3	26.4
50,001 to 100,000	19.4	19.7	26.7	28.1	28.0	53.2	24.4
100,001 to 250,000	18.7	21.2	24.7	24.4	27.4	36.0	22.8
250,001 to 500,000	21.5	17.7	25.0	30.2	34.8	29.7	24.2
500,001 to 1,000,000	15.5	-----	21.3	-----	-----	25.9	19.0
More than 1,000,000	14.4	-----	19.9	-----	-----	43.3	18.6
Total	19.6	13.7	24.4	24.9	21.2	37.2	21.3

¹ Based upon 1939 passenger car registrations and 1930 population.

Table 8 shows the number of trucks registered per 100 persons in each of the regions and population groups. The use of trucks as passenger vehicles as well as for hauling agricultural products and supplies probably accounts for the relatively high number of trucks owned by residents of rural areas. The incorporated places having a population of less than 10,000 had a relatively high truck registration compared to the larger cities. As in the case of passenger cars, the truck registration in the largest cities was comparatively low. Figure 3 is a graphic representation of the number of passenger cars and trucks registered per 100 persons in each of the population groups in the United States.

From a consideration of these data it is apparent that motor-vehicle ownership is more concentrated in the small and medium size cities than in the rural or unincorporated areas and the largest cities. It appears that increased ownership of vehicles will result in the largest cities only after adequate parking and storage facilities are provided and the convenience of using private vehicles is increased by relieving traffic congestion through improvement of street facilities. The economic status of large numbers of farmers and other residents of rural areas will also have to be changed considerably before any large increase in the number of rurally owned motor vehicles will result.

PASSENGER CARS GROUPED ACCORDING TO YEAR MODEL AND AVERAGE AGE

Since data regarding the distribution of passenger cars by year models in most States were obtained only for the year during which the motor-vehicle study was

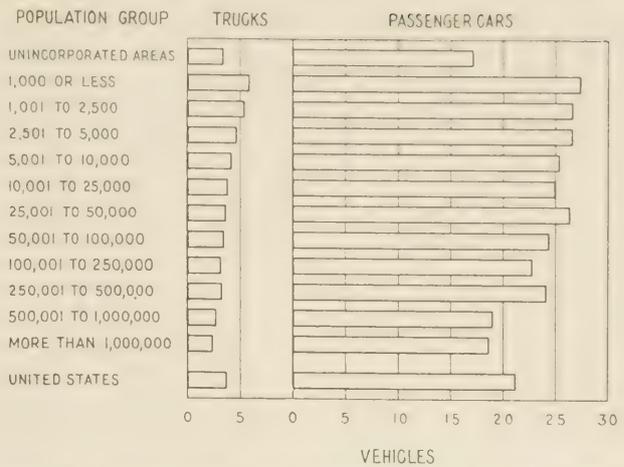


FIGURE 3.—TRUCK AND PASSENGER-CAR REGISTRATIONS PER 100 PERSONS IN 1939.

conducted, and since these data cannot be combined satisfactorily for average age computations for regions or on a country-wide basis, they are shown for individual States and for the period of the study only. Because the registration years vary considerably in the several States and because the motor-vehicle allocation studies were made for various periods, it is not considered practicable to present combined data for a particular period. Tabulations have been prepared which indicate the variation in the average age of passenger cars between rural areas and incorporated places in a number of States. In the case of two States, available data make possible the presentation of average age data for each of 3 years and for each of the population groups.

TABLE 8.—Number of trucks registered per 100 persons¹

Population group	Region						United States
	North-east	South-east	Middle States	North-west	South-west	Far West	
Unincorporated areas	3.7	2.3	3.5	5.6	4.2	5.8	3.1
Incorporated places having a population of—							
Less than 1,000	5.0	4.2	6.6	6.0	6.2	13.2	5.9
1,001 to 2,500	4.4	4.3	5.4	5.8	7.3	10.9	5.4
2,501 to 5,000	3.4	4.3	4.6	5.6	7.6	8.2	4.7
5,001 to 10,000	2.9	4.3	3.9	5.4	6.5	7.6	4.2
10,001 to 25,000	2.9	4.0	3.4	4.9	7.6	5.6	3.8
25,001 to 50,000	3.0	3.9	3.2	4.7	6.9	5.1	3.6
50,001 to 100,000	3.0	3.7	2.9	4.2	5.6	5.3	3.4
100,001 to 250,000	2.7	3.6	3.0	3.7	4.7	3.5	3.2
250,001 to 500,000	3.0	2.9	3.1	3.9	6.2	3.1	3.3
500,001 to 1,000,000	2.5	-----	3.0	-----	-----	3.6	2.8
More than 1,000,000	2.2	-----	2.2	-----	-----	4.7	2.4
Total	2.9	2.9	3.5	5.3	5.2	5.4	3.6

¹ Based upon 1939 truck registrations and 1930 population.

The average age of passenger cars registered during the year on which the motor-vehicle allocation studies were based in each of the States has been computed from the available year-model data. The following paragraphs describe the procedure used in these computations.

The first step in the computation of the average age of passenger cars involved the determination of the age of vehicles that had been in service for a period of less than 1 year. During the period in which the motor-vehicle allocation studies were being conducted most

of the manufacturers placed their new models on sale early in November. In more recent years the new models have in general been released during September and October. The count of the number of passenger cars of each year model in a State was made in most instances after the close of the registration year. Since the new car models were placed on sale during the fall season a few new models were usually registered in the calendar year preceding the year of the model. For example, a few 1939 model cars are included in the 1938 registrations of all States registering on a calendar-year basis or some period approximately coincident with the calendar year. In most cases new car registrations reported in November and December of each year represented sales of the new models for the next year. In order to include these cars in the average age calculations, vehicles registered in November were considered as having been in service an average of 2 months and vehicles registered in December as having been in service an average of 1 month on December 31.

In calculating the average age of vehicles of the same year model as the registration year in which the counts were made, the number of new car registrations effected during the year November 1 to October 31 was determined. Practically all of the new car sales for a particular year take place during the period from November of the year preceding the year of the model to the following October. For example, the major part of the 1938 models was sold during the last 2 months in 1937 and the first 10 months of 1938. Therefore, to compute the average age of the most recent year model the new car registrations in each month were tabulated. New vehicles registered in November and December were considered to have been in operation 12 months and 11 months, respectively, on the following October 31. Cars sold in each successive month were in service 1 month less. Vehicles sold in October were considered to have been in service for 1 month. The number of service months was obtained by multiplying the number of registrations in the month by the number of months in operation. The average age was determined by dividing the service months by the total number of new car registrations during the period. Adjustments to the beginning of the registration period were made by adding the difference in months between October 31 and the beginning of the registration period to the average age of the latest year models.

After determining the average age of vehicles in operation less than 1 year the average age of all passenger cars registered in each State was obtained by dividing the number of service years by the total registration. Automobiles of the year model preceding the latest year reported were considered to be 1 year older than the average age of the latest year model. Similarly, cars of earlier years were considered to be 2, 3, and 4 years older according to the year model of the vehicle.

Since many of the States did not determine the number of passenger cars of each year model older than 1925 a method was devised for apportioning these older vehicles to the several year model groups prior to the oldest year available. The number of 1924 and earlier year models registered in 1936 and subsequent years was so small that the omission of these vehicles from the calculations would have had but slight effect upon the results. Since a practical means of making the apportionment was available, they were included in the calculations.

AVERAGE AGE OF PASSENGER CARS IN 39 STATES VARIED FROM
4.49 TO 7.29 YEARS

A complete enumeration of all passenger cars registered in Connecticut by year models was made for the year 1939.⁵ The number of vehicles of each model from 1904 to 1939 was determined in this study. Similar information obtained from Virginia, Missouri, Nebraska, and Alabama provided the basis for construction of a table of the number of cars remaining in service after attaining the age of 12 years. This table was used in determining the number of cars of each year model older than 12 years for each of the States. Of the total number of vehicles registered which were 12 years or older, approximately 1 percent were 19 years or older. These vehicles were grouped and were found to average 22.10 years of age. In distributing vehicles to the various year model groups older than 19 years this small fraction of 1 percent of the total registration was considered to have an average age of 22.10 years.

The average age of passenger cars in each of 39 States is shown in table 9 as of the date indicated. The dates selected in the tabulation were controlled by the time covered by the motor vehicle allocation study and the registration year. Of the States represented in the tabulation, Massachusetts with 4.49 years had the lowest average age for passenger cars. The highest average age was found in South Dakota where the automobiles had an average age of 7.29 years at the end of March 1938. In 26 of the 39 States the average age of passenger cars was greater than 5 years and less than 6 years. In only 5 States was the average age less than 5 years and in 8 States the average exceeded 6 years. With the exception of Louisiana all of the States whose passenger cars averaged less than 5 years were situated in the East and Northeastern part of the United States.

The average age of passenger cars owned by residents of unincorporated areas is considerably higher than that of automobiles owned in the incorporated places. The average age of passenger cars owned in unincorporated areas in the 15 States shown in table 10 is without exception higher than the average age of vehicles owned by residents of incorporated places. In 4 of the 15 States the difference in average age is less than 1 year; in 8 States the difference is between 1 and 2 years; and in Arkansas, Minnesota, and North Dakota the difference between average ages of vehicles owned in the cities and unincorporated areas is in excess of 2 years. Registration records indicate that the purchase of used cars by rural residents, rather than the long life of automobiles purchased new by that group, is the chief factor in the differences in average age of vehicles in the rural areas and incorporated places.

AVERAGE AGE OF ALABAMA AND ARKANSAS PASSENGER CARS
GIVEN BY POPULATION GROUP

The motor-vehicle registration records for the registration years 1936, 1937, and 1938, for Alabama and Arkansas, have been tabulated on the basis of the number of year models of each type of vehicle registered in each of the several population groups in these States. These data have been used to compute the average age of passenger cars owned by residents of each population group for each of the three years.

⁵ Cars of Yesteryears, Connecticut State Department of Vehicles. (Mimeographed report.)

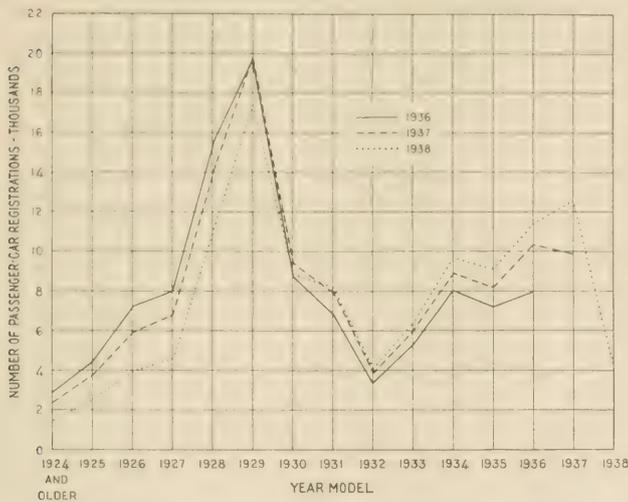


FIGURE 4.—REGISTRATION OF PASSENGER CARS BY YEAR MODELS IN THE UNINCORPORATED AREAS IN ALABAMA IN THE REGISTRATION YEARS 1936, 1937, AND 1938.

TABLE 9.—Average age of passenger cars registered on dates indicated

State	Date	Average age	
		Years	Age
Alabama	Sept. 30, 1936	5.53	
Arizona	Oct. 31, 1936	5.91	
Arkansas	Dec. 31, 1936	5.86	
California	do	5.82	
Colorado	do	6.61	
Connecticut	Feb. 28, 1939	5.12	
Florida	Dec. 31, 1936	5.36	
Idaho	Oct. 31, 1936	5.78	
Illinois	Oct. 31, 1935	5.20	
Indiana	Dec. 31, 1936	5.80	
Kansas	do	5.76	
Kentucky	Feb. 28, 1937	5.94	
Louisiana	Dec. 31, 1936	4.84	
Maine	Dec. 31, 1937	5.36	
Maryland	Mar. 31, 1937	4.70	
Massachusetts	Dec. 31, 1937	4.49	
Michigan	Oct. 31, 1935	5.51	
Minnesota	Dec. 31, 1936	6.22	
Missouri	Dec. 31, 1935	6.30	
Montana	Dec. 31, 1936	5.48	
Nebraska	Dec. 31, 1937	6.52	
Nevada	Oct. 31, 1936	5.07	
New Hampshire	do	5.13	
New Mexico	Dec. 31, 1936	5.64	
North Carolina	do	5.10	
North Dakota	Dec. 31, 1935	6.83	
Oklahoma	do	5.72	
Oregon	Oct. 31, 1936	6.30	
Rhode Island	do	4.89	
South Carolina	do	5.70	
South Dakota	Mar. 31, 1938	7.29	
Tennessee	do	5.37	
Utah	Oct. 31, 1936	5.55	
Vermont	Mar. 31, 1937	5.60	
Virginia	do	4.85	
Washington	Oct. 31, 1936	6.52	
West Virginia	June 30, 1936	5.42	
Wisconsin	Oct. 31, 1936	5.96	
Wyoming	do	5.06	

Table 11 gives the average age of passenger cars for each population group in Alabama. The average age of automobiles owned by persons living in the unincorporated areas was approximately 1 year higher than the average of all vehicles in the State and slightly more than 2 years higher than automobiles owned in the incorporated places. The average age of the passenger cars in unincorporated areas remained practically unchanged during 1936 and 1937 and then increased from 6.56 in 1937 to 6.64 in 1938. The effect of the large sale of 1937 cars is noticeable in the reduction in average age in 1937.

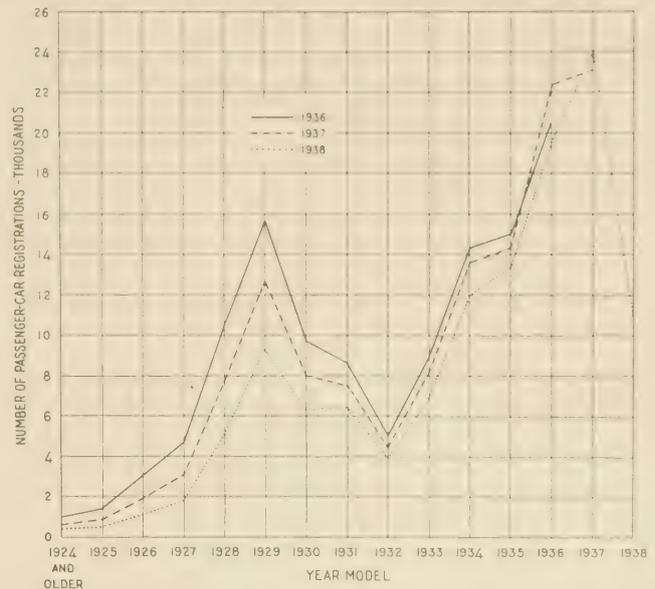


FIGURE 5.—REGISTRATION OF PASSENGER CARS BY YEAR MODELS IN THE INCORPORATED PLACES IN ALABAMA IN THE REGISTRATION YEARS 1936, 1937, AND 1938.

TABLE 10.—Average age of passenger cars registered in unincorporated areas and in incorporated places on dates indicated

State	Date	Average age		
		Unincorporated areas	Incorporated places	All areas
Alabama	Sept. 30, 1936	6.54	4.63	5.53
Arkansas	Dec. 31, 1936	7.10	4.56	5.86
Florida	do	6.10	5.09	5.36
Louisiana	do	5.48	4.50	4.84
Maryland	Mar. 31, 1937	5.11	4.41	4.70
Minnesota	Dec. 31, 1936	7.29	5.23	6.22
Missouri	do	7.46	5.56	6.30
North Dakota	do	7.71	5.54	6.83
Oklahoma	do	6.63	5.21	5.72
Oregon	Oct. 31, 1936	7.32	5.69	6.30
Utah	do	6.04	5.30	5.55
Vermont	Mar. 31, 1937	6.25	4.92	5.60
Virginia	do	5.21	4.15	4.85
Washington	Oct. 31, 1937	7.37	6.05	6.52
Wyoming	Oct. 31, 1936	5.64	4.66	5.06

TABLE 11.—Average age of passenger cars in each population group in Alabama on September 30 of the registration years 1936, 1937, and 1938

Population group	Registration year—		
	1936	1937	1938
Unincorporated areas	6.54	6.56	6.64
Incorporated places having a population of—			
Less than 1,000	4.91	4.62	4.60
1,001-2,500	4.34	4.10	4.40
2,501-5,000	4.53	4.24	4.52
5,001-10,000	4.50	4.34	4.51
10,001-25,000	4.58	4.35	4.51
Gadsden (32,586)	4.61	4.46	4.69
Montgomery (66,079)	4.55	4.23	4.50
Mobile (68,202)	5.20	5.07	5.17
Birmingham (259,678)	4.64	4.30	4.43
All incorporated places	4.63	4.37	4.55
All population groups	5.53	5.41	5.56

The shift of the older used cars from the cities to the rural areas is readily apparent when the data shown in figures 4 and 5 are compared. Figure 4 shows the number of passenger cars of each year model registered by residents of the unincorporated areas of Alabama for each of the three registration years 1936, 1937, and 1938.

Figure 5 shows comparable data for the incorporated places in Alabama. The predominance of 1929-year models in the rural areas and the slow rate at which they were being retired is apparent in figure 4.

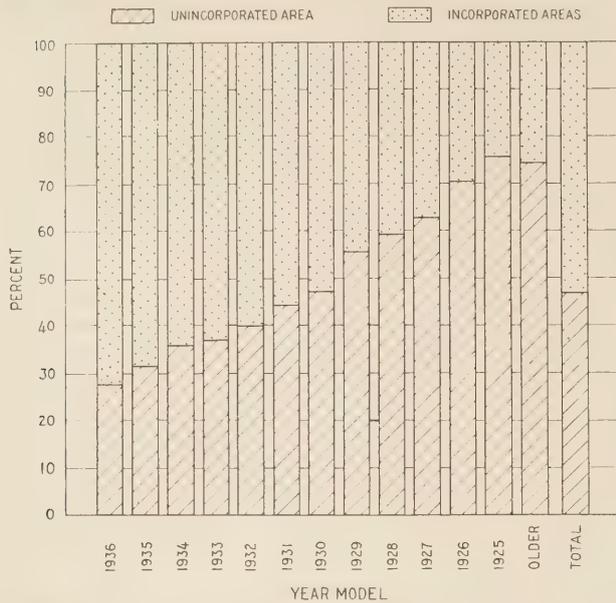


FIGURE 6.—PERCENTAGE OF EACH YEAR MODEL OF PASSENGER CARS REGISTERED IN THE UNINCORPORATED AND INCORPORATED AREAS OF ALABAMA IN 1936.

Starting with the 1931 models there was an increase in the number of older model cars registered in each of the three registration years. For example, there were 6,855 automobiles of the 1931 model registered in 1936. In 1937 this number had increased to 7,954 and in 1938 there were 8,171 of the 1931 models registered. There were similar increases for each subsequent year model for each of the three registration years. These increases in older car registrations were due to the shift of used cars from the cities to rural areas and the importation of used cars from other States.

In figure 5, which shows the number of vehicles registered in incorporated places, it is apparent that some of the older year models disappeared with each successive registration year with the exception of the latest model available during the registration year. The increase in the number of registrations of the latest model available is accounted for by sales of new vehicles after the close of the registration year on September 30.

In 1938, 10 years after the 1929-model automobile first became available, there were more cars of this model registered by residents of unincorporated areas than of any other year model. In the cities the registration of 1929-model cars was still large but they were disappearing at a rapid rate and in 1938 there were more cars of the 1934 and subsequent models registered than there were 1929 models. The percentage of each year model registered in the unincorporated and incorporated areas of Alabama in 1936 is presented graphically in figure 6. The predominance of newer cars in the cities is evidenced by the data shown in this graph.

Characteristics practically identical with the Alabama data are found in a similar presentation of Arkansas registration data for the registration years 1936, 1937, and 1938. There was, however, a general in-

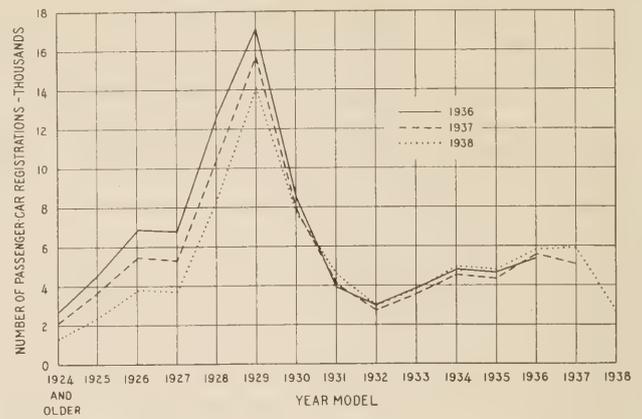


FIGURE 7.—REGISTRATION OF PASSENGER CARS BY YEAR MODELS IN THE UNINCORPORATED AREAS IN ARKANSAS IN THE REGISTRATION YEARS 1936, 1937, AND 1938.

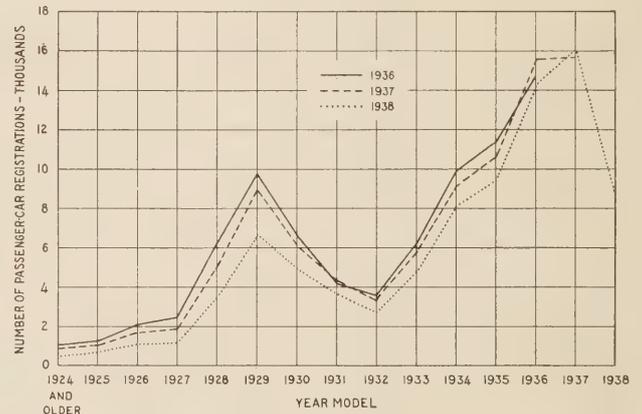


FIGURE 8.—REGISTRATION OF PASSENGER CARS BY YEAR MODELS IN THE INCORPORATED PLACES IN ARKANSAS IN THE REGISTRATION YEARS 1936, 1937, AND 1938.

crease in the average age of cars in Arkansas during the 3-year period. As in Alabama the average age of cars owned in the unincorporated areas was more than 2 years higher than the average age of cars owned in incorporated places. Table 12 gives the average age of Arkansas passenger cars for each of the registration years 1936, 1937, and 1938 and for each of the population groups in the State. Figures 7 and 8 show the number of vehicles of each year model registered in each of the three registration years. Here, as in Alabama, the preponderance of 1929 models is particularly outstanding in both the cities and rural areas. In 1938 there were still two and one-half times as many 1929 models registered as there were 1937 models. At the rate that used cars are being shifted from the cities to the rural areas it appears that the average age of cars owned in the rural areas in Arkansas will not be reduced an appreciable amount during the next several years.

MOTOR-VEHICLE REGISTRATION FEES CLASSIFIED BY POPULATION GROUPS

Collections of motor-vehicle registration fees totaled \$353,533,000 in 1939, \$237,612,000 of which was for passenger cars and \$98,666,000 for trucks. Bus registration fees totaled \$6,032,000 and owners of trailers and motorcycles paid \$11,223,000 in registration fees. Table 13 shows the amounts of registration fees paid by owners of each of the four types of vehicles in each of

TABLE 12.—Average age of passenger cars in each population group in Arkansas on December 31 of the registration years 1936, 1937, and 1938

Population group	Registration year		
	1936	1937	1938
Unincorporated areas	7.10	7.41	7.57
Incorporated places having a population of—			
Less than 1,000	5.36	5.29	5.36
1,001-2,500	4.89	4.78	5.01
2,501-5,000	4.45	4.38	4.54
5,001-10,000	4.33	4.31	4.59
10,001-25,000	4.37	4.43	4.45
Fort Smith (31,429)	4.51	4.53	4.65
Little Rock (81,679)	4.20	4.28	4.24
All incorporated places	4.56	4.55	4.65
All population groups	5.86	5.90	6.02

the regions and population groups. These data are expressed in percentages in table 14 for passenger cars and trucks.

A comparison of the data shown in tables 2 and 14 indicates that the proportion of passenger cars registered

in the unincorporated areas exceeds the proportion of registration fees paid by residents of these areas in all of the regions with the exception of the Northeast. The unincorporated areas of all regions combined accounted for 28.7 percent of the passenger-car registrations but residents of these areas paid only 26.4 percent of the total registration fees. Residents of incorporated places with populations of less than 1,000,000 paid registration fees which were proportional, with only slight variations, to the number of vehicles registered in each population group. The residents of cities having a population of more than 1,000,000 owned 10.7 percent of the passenger cars in the country and paid 12.9 percent of the total registration fees.

The net weight and horsepower of vehicles are the two bases which are predominant in the computation of license fees for passenger cars. Since a great many older cars, a large portion of which were light in weight, and a large portion of the lighter weight cars of the later models are registered in the unincorporated areas, it is to be expected that these factors would result in a low average registration fee in these areas and a low

TABLE 13.—Total motor-vehicle registration fees paid in 1939, by population groups¹

PASSENGER CARS

Region	Unincorporated areas	Incorporated places having a population of—											All places	Non-resident	Total		
		1,000 or less	1,001 to 2,500	2,501 to 5,000	5,001 to 10,000	10,001 to 25,000	25,001 to 50,000	50,001 to 100,000	100,001 to 250,000	250,001 to 500,000	500,001 to 1,000,000	More than 1,000,000					
		\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$,1000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Northeast	14,528	1,961	3,558	4,165	4,408	8,308	5,800	4,939	5,130	3,611	3,851	16,981	77,240	46	77,286		
Southeast	14,183	1,583	1,946	1,843	1,890	2,381	1,847	2,368	2,333	2,171	2,171	2,171	32,545	97	32,642		
Middle States	20,016	5,623	4,703	4,107	4,516	6,025	5,533	5,301	3,745	6,665	5,272	9,814	81,320	89	81,409		
Northwest	3,907	1,160	877	573	703	1,161	469	262	717	458	458	458	10,287	10	10,297		
Southwest	5,510	578	1,069	1,022	1,133	1,380	913	750	2,009	1,983	1,983	1,983	16,347	75	16,422		
Far West	4,690	320	607	814	1,166	1,687	1,092	1,624	1,072	1,426	1,181	3,845	19,524	32	19,556		
United States	62,834	11,225	12,760	12,524	13,816	20,942	15,654	15,244	15,006	16,314	10,304	30,640	237,263	349	237,612		

TRUCKS

Northeast	5,901	871	1,468	1,376	1,588	2,931	1,883	2,416	2,256	1,621	1,596	8,054	31,961	250	32,211
Southeast	5,954	860	1,001	930	952	1,144	874	1,120	1,018	889	889	889	14,742	306	15,108
Middle States	6,487	2,524	1,943	1,445	1,617	2,096	1,921	1,592	1,435	2,509	2,146	4,356	30,071	202	30,273
Northwest	1,766	548	402	310	257	379	126	87	272	120	120	120	4,267	131	4,398
Southwest	2,732	357	798	796	850	897	577	329	909	1,139	1,139	1,139	9,384	358	9,742
Far West	1,722	270	378	369	494	530	334	345	271	575	498	1,101	6,887	47	6,934
United States	24,562	5,430	5,990	5,226	5,758	7,977	5,715	5,889	6,161	6,853	4,240	13,511	97,312	1,354	98,666

BUSSES

Northeast	33	29	61	66	90	253	432	149	350	117	104	903	2,587	335	2,922
Southeast	93	27	18	21	34	85	83	147	193	188	188	188	889	101	990
Middle States	51	16	15	21	29	37	102	77	81	324	218	68	1,039	136	1,175
Northwest	21	7	6	4	4	21	5	1	39	5	5	5	113	35	148
Southwest	6	1	1	15	15	23	34	10	146	57	57	57	308	54	362
Far West	30	5	8	12	15	22	18	16	37	45	99	107	434	1	435
United States	234	85	109	139	187	411	674	400	846	756	421	1,078	5,370	662	6,032

OTHER VEHICLES

Northeast	407	57	100	95	95	176	106	136	110	120	137	397	1,936	36	1,972
Southeast	554	180	193	202	165	202	135	175	195	130	372	604	2,131	208	2,339
Middle States	746	204	194	163	217	292	262	221	253	495	495	495	4,023	53	4,076
Northwest	158	35	28	18	18	33	6	2	20	12	12	12	335	13	348
Southwest	274	36	70	59	78	91	56	23	127	88	88	88	902	54	956
Far West	303	44	88	88	117	130	77	98	84	126	78	298	1,531	1	1,532
United States	2,442	556	673	625	690	924	642	660	789	971	587	1,299	10,858	365	11,223

ALL VEHICLES

Northeast	20,809	2,918	5,187	5,702	6,181	11,668	8,221	7,640	7,846	5,469	5,685	26,335	113,724	667	114,391
Southeast	20,784	2,650	3,158	2,996	3,041	3,812	2,939	3,810	3,739	3,378	3,378	3,378	50,307	772	51,079
Middle States	27,300	8,367	6,855	5,736	6,379	8,450	7,818	7,191	5,514	9,993	8,008	14,842	116,453	480	116,933
Northwest	5,852	1,750	1,313	905	982	1,594	606	357	1,045	595	595	595	15,002	189	15,191
Southwest	8,522	972	1,938	1,892	2,076	2,391	1,580	1,112	3,191	3,267	3,267	3,267	26,941	541	27,482
Far West	6,745	639	1,081	1,283	1,792	2,369	1,521	2,083	1,464	2,192	1,856	5,351	28,376	81	28,457
United States	90,072	17,296	19,532	18,514	20,451	30,284	22,685	22,193	22,802	24,894	15,552	46,528	350,803	2,730	353,533

¹ Source: Public Roads Administration table MV-2, 1939. Planning survey data were used for population group distribution and adjustments in vehicle types.

TABLE 14.—Percentage distribution of passenger-car and truck registration fees paid in 1939, by population groups

Region	Unincorporated areas	Incorporated places having a population of—												All places	Non-resident	Total
		1,000 or less	1,001 to 2,500	2,501 to 5,000	5,001 to 10,000	10,001 to 25,000	25,001 to 50,000	50,001 to 100,000	100,001 to 250,000	250,001 to 500,000	500,001 to 1,000,000	More than 1,000,000				
		Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent	Percent			
Northeast.....	18.8	2.5	4.6	5.4	5.7	10.7	7.5	6.4	6.6	4.7	5.0	22.0	99.9	0.1	100.0	
Southeast.....	43.4	4.8	6.0	5.6	5.8	7.3	5.7	7.3	7.1	6.7	-----	-----	99.7	.3	100.0	
Middle States.....	24.6	6.9	5.8	5.0	5.5	7.4	6.8	6.5	4.6	8.2	6.5	12.1	99.9	.1	100.0	
Northwest.....	37.9	11.3	8.5	5.6	6.8	11.3	4.6	2.5	7.0	4.4	-----	-----	99.9	.1	100.0	
Southwest.....	33.5	3.5	6.5	6.2	6.9	8.4	5.6	4.6	12.2	-----	-----	-----	99.5	.5	100.0	
Far West.....	24.0	1.6	3.1	4.2	6.0	8.6	5.6	8.3	5.5	7.3	6.0	19.6	99.8	.2	100.0	
United States.....	26.4	4.7	5.4	5.3	5.8	8.8	6.6	6.4	6.3	6.9	4.4	12.9	99.9	.1	100.0	

TRUCKS															
Region	Unincorporated areas	1,000 or less	1,001 to 2,500	2,501 to 5,000	5,001 to 10,000	10,001 to 25,000	25,001 to 50,000	50,001 to 100,000	100,001 to 250,000	250,001 to 500,000	500,001 to 1,000,000	More than 1,000,000	All places	Non-resident	Total
Northeast.....	18.3	2.7	4.6	4.3	4.9	9.1	5.8	7.5	7.0	5.0	5.0	25.0	99.2	0.8	100.0
Southeast.....	39.4	5.7	6.6	6.2	6.3	7.6	5.8	7.4	6.7	5.9	-----	-----	97.6	2.4	100.0
Middle States.....	21.4	8.3	6.4	4.8	5.3	6.9	6.4	5.3	4.7	8.3	7.1	14.4	99.3	.7	100.0
Northwest.....	40.2	12.5	9.1	7.0	5.8	8.6	2.9	2.0	6.2	2.7	-----	-----	97.0	3.0	100.0
Southwest.....	28.0	3.7	8.2	8.2	8.7	9.2	5.9	3.4	9.3	11.7	-----	-----	96.3	3.7	100.0
Far West.....	24.8	3.9	5.5	5.3	7.1	7.6	4.8	5.0	3.9	8.3	7.2	15.9	99.3	.7	100.0
United States.....	24.9	5.5	6.1	5.3	5.8	8.1	5.8	6.0	6.2	6.9	4.3	13.7	98.6	1.4	100.0

proportion of the total registration fees compared to the number of vehicles registered. The relatively high average registration fees paid by owners of cars in the largest cities and the high proportion of registration fees compared to the proportion of vehicles registered are caused by the fact that a large portion of the newer and heavier vehicles are owned in these cities.

Characteristics similar to those for passenger cars are noted in the distribution of trucks and the corresponding payments of truck registration fees. However, there is a more marked difference between the proportion of trucks registered in the unincorporated areas and the proportion of registration fees paid by truck owners resident in these areas. The unincorporated areas account for 34.0 percent of the registrations and only 24.9 percent of the fees paid. The use of light pick-up trucks serving the dual purpose of passenger car and truck on farms is undoubtedly the major factor in the low average fee paid and the low proportion of fees compared to the number of truck registrations. While only 8.2 percent of all trucks are registered by owners residing in cities over 1,000,000 population, registration fees for these trucks are 13.7 percent of the total. The relatively high average truck registration fees and the consequently greater proportion of fees paid for trucks in the larger cities is due to the number of heavy, freight-carrying vehicles registered by the trucking companies in these cities.

Residents of unincorporated areas paid a total of \$62,834,000 in registration fees on passenger cars and \$24,562,000 on trucks. Since few busses are registered in unincorporated areas the fees paid on these vehicles by residents of unincorporated areas are a very small percentage of the total collected. Fees paid on motorcycles and trailers owned in unincorporated areas totaled \$2,442,000. These amounts with the exception of the bus registration fees exceeded the payments made by residents of any other population group. The motor-vehicle owners resident in cities having a population of more than 1,000,000 were the second largest contributors of registration fees for all types of vehicles. Total collections from this population group were \$46,528,000.

The average registration fees paid by owners of the four types of vehicles in each of the regions and popu-

lation groups are shown in table 15. The averages shown in this table for passenger cars and trucks are based upon complete data and they are considered to be the most accurate obtainable. Since the bus and "other" vehicle data are not as complete as may be desired, the averages for these vehicles are not as accurate as those shown for passenger cars and trucks. Lack of data and the fact that the data for the various States are not entirely comparable make it difficult to present significant average figures for busses and "other" vehicles. The averages shown are based upon the best available data.

NORTHEAST REGION HAD HIGHEST AVERAGE REGISTRATION FEES FOR PASSENGER CARS AND TRUCKS

The average passenger-car registration fee in the United States in 1939 was \$9.09 and the average truck registration fee was \$22.41. The owners of busses paid an average registration fee of \$81.31 per vehicle. Passenger-car and truck owners residing in the Northeast region paid a higher average registration fee on their passenger cars and trucks than residents of the other five regions. The range of average registration fees for passenger cars was from \$5.60 in the Northwest region to \$10.72 in the Northeast. Average truck registration fees ranged from \$11.08 in the Northwest to \$29.61 in the Northeast.

The average registration fees paid by nonresident owners of passenger cars were slightly higher than the average paid by residents in all regions except in the Southwest and Far West. Nonresident owners of trucks and busses paid average registration fees which ranged from one and four-tenths to four times as much as the average fees paid by resident owners, except in the Far West region where average fees paid by nonresident owners of busses were only one-third those paid by residents.

Passenger-car owners living in cities having a population of more than 1,000,000 paid the highest average registration fees of any population group while the residents of unincorporated areas paid the lowest average registration fees. The highest average fee for passenger cars, which was \$13.28, was paid by residents of cities having a population of more than 1,000,000 in the Northeast region while the lowest average fee of \$4.80

TABLE 15.—Average vehicle registration fee paid in 1939, by population groups

PASSENGER CARS

Region	Unincorporated areas	Incorporated places having a population of—											All places	Non-resident	Total
		1,000 or less	1,001 to 2,500	2,501 to 5,000	5,001 to 10,000	10,001 to 25,000	25,001 to 50,000	50,001 to 100,000	100,001 to 250,000	250,001 to 500,000	500,001 to 1,000,000	More than 1,000,000			
Northeast	\$10.87	\$11.28	\$11.26	\$10.77	\$10.24	\$10.28	\$9.54	\$10.39	\$9.12	\$9.20	\$8.78	\$13.28	\$10.72	\$14.73	\$10.72
Southeast	8.21	8.40	8.76	9.00	9.00	9.14	9.56	9.61	10.63	7.91	8.69	11.55	8.69	11.55	8.69
Middle States	9.15	9.95	9.93	10.26	9.82	10.10	10.05	10.37	9.65	9.57	10.76	9.99	9.80	10.77	9.80
Northwest	5.21	5.89	5.78	5.82	6.16	6.55	7.16	4.91	5.00	5.28	5.60	6.29	5.60	6.29	5.60
Southwest	7.73	7.87	8.42	8.91	7.98	9.29	8.24	10.02	8.89	10.31	8.51	5.91	8.51	5.91	8.49
Far West	5.98	4.80	5.92	6.28	6.76	6.33	6.67	7.18	5.82	5.04	7.17	7.17	6.34	4.94	6.34
United States	8.38	8.88	9.16	9.38	9.03	9.27	9.25	9.61	8.70	8.47	9.42	10.95	9.09	8.62	9.09

TRUCKS

Northeast	26.00	24.29	26.15	26.35	27.69	27.25	25.96	32.52	28.02	29.22	22.69	41.42	29.49	62.52	29.61
Southeast	15.44	19.51	20.13	20.43	22.26	21.50	25.27	24.30	27.66	19.76	30.61	39.93	18.82	35.47	19.04
Middle States	18.62	22.61	23.45	23.44	24.81	26.97	28.62	28.59	30.72	29.38	30.61	39.93	25.45	46.06	25.53
Northwest	8.95	12.67	12.74	15.80	12.35	12.86	11.56	10.78	12.55	10.61	10.83	42.62	10.83	42.62	11.08
Southwest	13.46	19.08	22.15	23.93	24.05	24.56	23.53	21.88	23.36	33.31	19.73	32.95	19.73	32.95	20.03
Far West	12.63	13.85	14.42	14.13	14.81	14.98	15.32	15.19	15.22	19.18	21.84	19.03	15.31	24.38	15.35
United States	16.40	19.89	21.21	21.93	22.60	23.47	24.69	26.54	25.42	26.22	25.97	37.38	22.28	39.15	22.41

BUSES

Northeast	57.93	67.97	62.41	69.42	64.02	75.46	98.52	74.55	81.50	48.24	89.54	221.39	99.39	136.81	102.60
Southeast	12.86	21.45	19.70	34.86	53.27	48.66	97.92	67.71	174.01	101.19	149.78	211.80	48.28	82.36	50.40
Middle States	55.31	49.86	77.62	106.30	123.25	114.73	153.07	141.71	174.25	218.09	149.78	211.80	145.65	249.24	153.04
Northwest	19.14	20.01	29.25	27.94	26.59	53.01	26.16	17.51	67.08	20.45	33.14	91.23	33.14	91.23	39.04
Southwest	20.27	33.44	36.83	85.56	62.60	49.78	65.75	57.63	68.80	108.17	67.23	129.53	67.23	129.53	72.40
Far West	32.19	34.72	31.37	39.09	29.94	34.61	40.50	25.97	51.32	73.17	40.13	65.05	45.57	14.05	45.36
United States	21.11	33.95	41.96	57.68	59.01	63.78	95.54	71.95	91.04	101.83	82.89	178.25	77.72	130.22	81.31

OTHER VEHICLES

Northeast	11.96	8.89	9.65	9.95	9.79	9.71	9.87	13.06	11.23	20.85	14.79	11.46	11.47	61.12	11.64
Southeast	9.31	12.37	16.17	19.75	21.23	20.07	19.22	21.76	25.78	29.87	15.11	15.11	15.11	58.52	16.18
Middle States	4.02	3.36	4.09	4.59	5.96	6.75	7.30	6.34	7.42	15.48	24.53	16.30	6.73	13.12	6.78
Northwest	2.22	3.28	3.48	3.55	3.12	4.13	4.29	3.86	4.70	14.48	2.87	35.74	2.87	35.74	2.97
Southwest	9.43	11.40	11.34	10.54	13.24	12.51	12.60	7.18	12.83	13.06	12.02	13.48	11.08	30.70	11.49
Far West	5.76	6.09	6.75	6.24	5.77	7.21	6.42	6.85	9.41	12.60	12.02	13.48	7.68	6.18	7.68
United States	5.66	5.41	6.95	7.81	8.03	8.82	8.98	9.09	10.60	16.27	18.98	13.85	8.32	34.67	8.53

ALL VEHICLES

Northeast	13.06	13.48	13.53	12.69	12.39	12.45	11.81	13.59	11.94	11.99	10.95	17.42	13.40	65.61	13.46
Southeast	9.54	10.67	11.10	11.47	11.64	11.71	12.47	12.59	14.11	10.37	13.88	13.15	10.73	32.90	10.84
Middle States	10.03	11.34	11.35	11.53	11.35	11.77	11.95	11.94	11.75	12.26	13.88	13.15	11.55	27.87	11.57
Northwest	5.74	6.96	6.86	7.35	6.97	7.41	7.77	5.64	6.17	6.00	9.45	8.66	6.38	35.32	6.44
Southwest	9.02	10.19	11.45	12.31	11.32	12.40	11.26	11.93	11.53	13.97	9.45	8.66	10.85	21.06	10.95
Far West	6.92	6.84	7.61	7.54	7.91	7.39	7.68	7.90	6.91	6.77	9.45	8.66	7.59	9.43	7.59
United States	9.55	10.53	11.00	11.18	10.92	11.18	11.33	11.76	11.12	11.04	12.03	14.28	11.02	30.16	11.07

was paid by residents of incorporated places having a population of less than 1,000 in the Far West region. Residents of unincorporated areas generally paid lower average registration fees for passenger cars in all regions than did the residents of the incorporated cities and towns.

Weight and horsepower of vehicles are the dominant factors in determining the amount of annual registration fees paid by automobile owners. A large proportion of the older vehicles registered in rural areas are comparatively light in weight and low in horsepower. These factors probably account for the difference in the average fees paid in the rural and urban areas. Another important factor is that the age of the vehicle has a direct effect upon the amount of license fee charged in nine States. The difference in age of cars owned in cities and those owned in the rural areas is sufficient to produce a significant difference in the average fee paid.

The comparatively low registration fee for passenger cars in Massachusetts and in the District of Columbia

exerts considerable influence on the averages for the Northeast region. The several large cities in Massachusetts with populations in excess of 50,000 is the dominating influence which accounts for the low average fees in these places compared to the smaller cities and unincorporated areas in this region.

AVERAGE MOTOR-FUEL TAX ABOUT TWICE AVERAGE REGISTRATION FEE

Truck owners residing in unincorporated areas paid the lowest registration fee for this type of vehicle, the average being \$16.40. The fact that special registration fee schedules are in effect for farm trucks in 17 States probably accounts for this low average fee in comparison with the higher fees paid by owners resident in the cities. The prevalence of light pick-up trucks which are used by farmers for both passenger and hauling service and which usually require a lower registration fee than the heavier trucks found in cities is another reason for the low average truck fee paid by residents of unincorporated areas.

Perhaps the most outstanding fact about motor-fuel tax collections is their relatively large amount as compared with registration fee receipts. A comparison of table 16 with table 13 indicates that in general the amount of motor-fuel tax collections is about twice the amount of registration fee receipts, both in total and for individual population groups. A similar comparison of table 17 with table 15 indicates that in general the amount of the average motor-fuel tax payment is about twice the amount of the average registration fee payment, in any or all population groups. For either the total or average amounts the relative differences are more pronounced in the case of passenger cars and less noticeable in the case of trucks. In the case of passenger cars, for example, total or average motor-fuel tax receipts for all population groups are more than double the corresponding total or average motor-vehicle registration fee receipts, and the same condition obtains in each of the individual population groups except one—incorporated places of more than 1,000,000 persons. In the case of trucks, however, total or average motor-fuel tax receipts for all population groups are consistently somewhat less than double the amount of corresponding total or average motor-vehicle registration fee receipts.

The relations existing between motor-fuel tax receipts and motor-vehicle registration fee receipts in the indi-

vidual regions, although showing the same general tendencies, vary considerably from the relations which exist for the United States as a whole. For passenger cars in the Northeast, for example, total or average motor-fuel tax receipts are less than double the amount of corresponding total or average motor-vehicle registration fee receipts, in all except two of the population groups; while in the Southeast, total or average motor-fuel tax receipts are more than three times the amount of corresponding total or average motor-vehicle registration fee receipts in all population groups. For trucks in the Northeast, total or average motor-fuel tax receipts exceed corresponding total or average motor-vehicle registration fee receipts only slightly in a majority of the population groups, and in incorporated places of more than 1,000,000 persons are less than the corresponding total or average registration fee receipts. In the Southeast, however, total or average motor-fuel tax receipts for trucks are in all population groups about three times the amount of corresponding total or average motor-vehicle registration fee receipts.

Table 18 shows for the year 1939 net motor-fuel tax collections in the United States according to the several types of use on account of which the tax accrues. The primary distinction is between highway and nonhighway use, and of the \$816,433,000 total net taxes collected, \$804,059,000 or 98.5 percent was collected on

TABLE 16.—Total State motor-fuel taxes paid for motor vehicle use in 1939, by population groups ¹

PASSENGER CARS															
Region	Unincorporated areas	Incorporated places having a population of—											All places	Non-resident	Total
		1,000 or less	1,001 to 2,500	2,501 to 5,000	5,001 to 10,000	10,001 to 25,000	25,001 to 50,000	50,001 to 100,000	100,001 to 250,000	250,001 to 500,000	500,001 to 1,000,000	More than 1,000,000			
	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000
Northeast	23,403	3,219	5,914	7,561	8,346	16,447	11,466	9,290	10,401	5,814	9,689	27,442	138,992	54	139,046
Southeast	44,347	6,265	7,379	7,104	7,030	9,059	6,535	8,389	8,912	9,304	9,304	9,304	114,324	249	114,573
Middle States	31,752	9,057	8,188	7,147	8,560	11,413	10,384	9,603	8,094	16,060	10,170	18,734	149,112	150	149,262
Northwest	11,001	3,230	2,718	1,759	2,084	3,293	1,319	1,101	2,880	1,713	1,713	1,713	31,098	33	31,131
Southwest	13,528	1,597	2,995	2,784	3,305	3,898	2,888	1,771	5,573	5,308	5,308	5,308	43,647	257	43,904
Far West	13,296	1,218	1,807	2,232	2,906	4,798	2,882	3,755	3,464	6,369	2,520	9,561	54,808	129	54,937
United States	137,327	24,586	28,951	28,587	32,231	48,908	35,474	33,909	39,324	44,568	22,379	55,737	531,981	872	532,853

TRUCKS															
Region	Unincorporated areas	1,000 or less	1,001 to 2,500	2,501 to 5,000	5,001 to 10,000	10,001 to 25,000	25,001 to 50,000	50,001 to 100,000	100,001 to 250,000	250,001 to 500,000	500,001 to 1,000,000	More than 1,000,000	All places	Non-resident	Total
Northeast	6,187	1,104	1,733	1,687	1,907	3,676	2,437	2,899	2,800	1,645	3,599	7,893	37,567	118	37,685
Southeast	17,702	2,893	3,305	3,138	2,764	3,899	2,492	3,003	3,335	2,497	2,497	2,497	45,028	621	45,649
Middle States	7,303	3,279	2,511	1,989	2,270	2,851	2,723	2,387	2,348	3,851	2,596	5,987	40,095	162	40,257
Northwest	4,045	1,493	1,238	774	806	1,333	401	312	798	419	419	419	11,619	103	11,722
Southwest	4,789	643	1,282	1,327	1,342	1,490	1,146	630	1,310	1,917	1,917	1,917	15,876	319	16,195
Far West	3,451	625	847	841	1,041	1,208	727	726	725	1,391	832	2,106	14,520	59	14,579
United States	43,477	10,037	10,916	9,756	10,130	14,457	9,926	9,957	11,316	11,720	7,027	15,986	164,705	1,382	166,087

BUSSES															
Region	Unincorporated areas	1,000 or less	1,001 to 2,500	2,501 to 5,000	5,001 to 10,000	10,001 to 25,000	25,001 to 50,000	50,001 to 100,000	100,001 to 250,000	250,001 to 500,000	500,001 to 1,000,000	More than 1,000,000	All places	Non-resident	Total
Northeast	66	63	145	131	187	650	912	461	1,055	451	299	1,202	5,622	471	6,093
Southeast	675	120	88	90	158	651	362	743	593	383	383	383	3,863	350	4,213
Middle States	50	26	26	33	50	62	165	153	97	392	333	74	1,461	161	1,622
Northwest	170	26	24	14	30	117	44	22	194	65	65	65	706	94	800
Southwest	85	2	5	44	67	123	163	46	814	204	204	204	1,553	87	1,640
Far West	69	22	37	52	57	114	76	64	190	257	210	229	1,377	172	1,549
United States	1,115	259	325	364	549	1,717	1,722	1,489	2,943	1,752	842	1,505	14,582	1,175	15,757

ALL VEHICLES															
Region	Unincorporated areas	1,000 or less	1,001 to 2,500	2,501 to 5,000	5,001 to 10,000	10,001 to 25,000	25,001 to 50,000	50,001 to 100,000	100,001 to 250,000	250,001 to 500,000	500,001 to 1,000,000	More than 1,000,000	All places	Non-resident	Total
Northeast	29,656	4,386	7,792	9,379	10,440	20,773	14,815	12,650	14,256	7,919	13,587	36,537	182,181	643	182,824
Southeast	62,724	9,278	10,772	10,332	9,952	13,609	9,389	12,135	12,840	12,184	12,184	12,184	163,215	1,220	164,435
Middle States	39,105	12,362	10,675	9,169	10,880	14,326	13,272	12,143	10,539	20,303	13,099	24,795	190,668	473	191,141
Northwest	15,216	4,749	3,980	2,547	2,920	4,743	1,764	1,435	3,872	2,197	2,197	2,197	43,423	230	43,653
Southwest	18,402	2,242	4,282	4,155	4,714	5,511	4,197	2,447	7,697	7,429	7,429	7,429	61,076	663	61,739
Far West	16,816	1,865	2,691	3,125	4,004	6,120	3,685	4,545	4,379	8,017	3,582	11,896	70,705	200	70,905
United States	181,919	34,882	40,192	38,707	42,910	65,082	47,122	45,355	53,583	58,040	30,248	73,228	711,268	3,429	714,697

¹ This table includes only motor-fuel taxes paid by motor-vehicle owners for travel within the State of registration. It does not include motor-fuel taxes paid by vehicles traveling in States other than that of registration or taxes paid on gasoline used in publicly owned vehicles.

TABLE 17.—Average State motor-fuel taxes paid in 1939, by population groups

Region	Unincorporated areas	Incorporated places having a population of—											All places	Non-resident	Total
		1,000 or less	1,001 to 2,500	2,501 to 5,000	5,001 to 10,000	10,001 to 25,000	25,001 to 50,000	50,001 to 100,000	100,001 to 250,000	250,001 to 500,000	500,001 to 1,000,000	More than 1,000,000			
		Northeast	\$17.52	\$18.52	\$18.71	\$19.55	\$19.40	\$20.35	\$18.85	\$19.54	\$18.48	\$14.81			
Southeast	25.68	33.24	33.22	34.69	33.47	34.78	33.84	34.06	40.60	33.89	---	---	30.52	29.85	30.52
Middle States	14.52	16.03	17.18	17.86	18.60	19.12	18.86	18.80	20.85	23.07	20.75	19.07	17.96	18.30	17.97
Northwest	14.66	16.39	17.91	17.85	18.24	18.57	20.15	20.62	20.11	19.75	---	---	16.92	21.87	16.92
Southwest	18.99	21.74	23.57	24.29	23.27	26.25	26.06	23.67	24.67	27.60	---	---	22.71	20.33	22.69
Far West	16.95	18.28	17.62	17.21	16.85	18.00	17.60	16.61	18.79	22.50	15.30	17.84	17.79	20.16	17.80
United States	18.32	19.45	20.78	21.42	21.08	21.66	20.97	21.37	22.81	23.15	20.47	19.93	20.39	21.67	20.39

TRUCKS															
Region	Unincorporated areas	1,000 or less	1,001 to 2,500	2,501 to 5,000	5,001 to 10,000	10,001 to 25,000	25,001 to 50,000	50,001 to 100,000	100,001 to 250,000	250,001 to 500,000	500,001 to 1,000,000	More than 1,000,000	All places	Non-resident	Total
Northeast	\$27.26	\$30.79	\$30.88	\$32.30	\$33.27	\$34.17	\$33.59	\$39.01	\$34.77	\$29.66	\$51.16	\$40.59	\$34.67	\$29.52	\$34.65
Southeast	45.91	65.65	66.45	68.93	64.64	73.30	72.04	65.16	90.56	55.48	---	---	57.48	60.23	57.52
Middle States	20.97	29.37	30.31	32.26	34.83	36.68	40.57	42.88	50.26	45.08	37.02	54.88	33.94	37.09	33.95
Northwest	20.51	34.48	39.29	39.49	38.72	45.18	36.89	38.89	36.86	36.87	---	---	29.50	33.27	29.53
Southwest	23.59	34.34	35.60	39.91	37.98	40.81	46.72	41.87	33.67	56.08	---	---	33.39	29.35	33.30
Far West	25.30	32.07	32.30	32.20	31.20	34.16	33.34	31.98	40.78	46.43	36.47	36.38	32.28	30.62	32.27
United States	29.03	36.76	38.65	40.93	39.76	42.54	42.88	44.89	46.68	44.83	43.03	44.23	37.71	39.98	37.73

BUSSES															
Region	Unincorporated areas	1,000 or less	1,001 to 2,500	2,501 to 5,000	5,001 to 10,000	10,001 to 25,000	25,001 to 50,000	50,001 to 100,000	100,001 to 250,000	250,001 to 500,000	500,001 to 1,000,000	More than 1,000,000	All places	Non-resident	Total
Northeast	\$114.92	\$147.47	\$148.18	\$137.18	\$133.33	\$194.21	\$207.92	\$231.40	\$245.51	\$185.78	\$257.76	\$294.78	\$216.01	\$192.37	\$213.98
Southeast	92.96	96.46	94.46	146.94	246.06	370.86	426.33	342.34	536.14	206.86	---	---	209.68	285.32	214.39
Middle States	53.52	81.05	136.78	170.18	214.63	189.06	248.88	282.26	209.37	264.18	228.59	229.54	204.95	294.14	211.31
Northwest	159.62	74.44	114.48	86.12	203.94	291.72	232.12	321.74	337.35	274.56	---	---	207.63	245.40	211.46
Southwest	268.78	96.67	132.80	244.39	276.34	270.76	318.57	257.94	383.14	389.59	---	---	338.58	209.67	327.89
Far West	74.03	152.78	145.10	169.38	113.77	181.05	168.40	106.15	265.12	291.28	85.30	138.64	144.52	194.78	144.85
United States	100.60	103.43	125.10	151.04	173.24	248.33	244.20	268.18	317.03	236.60	165.85	248.72	211.05	231.20	212.43

account of highway use. Of this total highway use, resident private vehicles accounted for \$711,268,000 and nonresident private vehicles accounted for \$3,429,000, so that the two types of private highway use account for \$714,697,000 or 87.5 percent of total net collections. Publicly owned and "foreign" vehicles together account for \$89,362,000 or 11 percent of total net collections.

TABLE 18.—Motor-fuel tax collections in the United States in 1939

Classification	Amount	Percentage of total
Highway use:		
Resident	\$711,268,000	87.1
Nonresident	3,429,000	.4
Publicly owned	10,728,000	1.3
Foreign	78,634,000	9.7
Total highway use	804,059,000	98.5
Nonhighway use	12,374,000	1.5
Total net taxes collected	816,433,000	100.0

All distributions of motor-fuel taxes presented in this study are based on the \$714,697,000 collected on account of resident and nonresident private vehicle use, data on publicly owned and "foreign" vehicles being excluded. To obtain the included distributions total net motor-fuel tax receipts as presented by the Public Roads Administration's annual statistical table G-1 for the year 1939 were separated by means of data supplied by the States into those resulting from highway use and those resulting from nonhighway use. The highway portion was then apportioned to vehicle types and to population groups on the basis of the motor-vehicle allocation studies. To make this apportionment it was assumed that the ratio of motor-vehicle fuel used by "foreign" and publicly owned vehicles to total motor-vehicle fuel used was the same in 1939 as in the year of

the motor-vehicle allocation study, and on that basis it was possible to allocate a part of the highway portion of total net motor-fuel tax collections to travel by foreign and publicly owned vehicles.

The remainder of the highway portion of the net motor-fuel tax collections was attributable to travel by resident and nonresident privately owned vehicles and was apportioned to vehicle types by multiplying the number of vehicles of each type registered in 1939 by the average annual fuel consumption for that type as determined by the motor-vehicle allocation study, and converting the resulting gallonage to dollars on the basis of the applicable fuel tax rate in the particular State, and then adjusting to that amount of the highway portion of total net motor-fuel tax collections previously determined as being attributable to travel by resident and nonresident privately owned motor vehicles. This procedure corrects for relative increases or decreases in the different types of vehicles, but assumes that their distribution among population groups and their relative gasoline consumptions remain the same as during the year of the motor-vehicle allocation study.

NEWER CARS DRIVEN GREATER MILEAGE

An individual allocation of this kind was made for each State that had completed a motor-vehicle allocation study. In the case of those few States that had not made such studies, the total net motor-fuel tax receipts from highway use were allocated and apportioned on the basis of other States in the same region for which the studies were available. The final results, then, are a series of distributions by vehicle types and population groups of that portion of the total net motor-fuel tax collections for each State that is attributable to resident and nonresident privately owned motor vehicles. Motor-fuel tax collections resulting

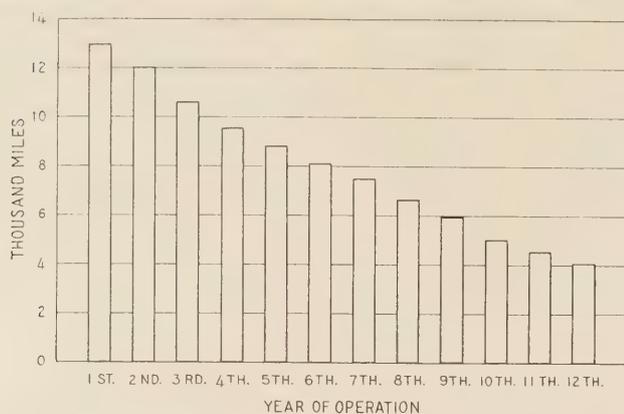


FIGURE 9.—AVERAGE ANNUAL MILEAGE TRAVELED BY PASSENGER CARS CLASSIFIED BY YEAR OF OPERATION BASED ON DATA FROM 35 STATES.

from highway use by publicly owned and "foreign" vehicles and from nonhighway use are not included, because they could not logically be apportioned to population groups.

The amount of motor-fuel taxes collected in any particular case depends on annual mileage, the gasoline consumption rate, the amount of the tax per gallon, and the number of vehicles involved. The computation of average motor-fuel tax payments, of course, eliminates the influence of the number of vehicles. Since the amounts of the tax per gallon are fixed, the determination of the amounts of motor-fuel taxes paid by owners of vehicles residing in each of the population groups requires a study of annual mileage traveled and rate of motor-fuel consumption only. There is considerable variation in the annual mileages that vehicles are driven during each year of their service lives, but the variation in motor-fuel consumption rates, as expressed in miles per gallon, is comparatively small during the lives of motor vehicles.

Table 19 shows the average number of miles passenger cars in various years of operation were driven and the average number of miles obtained per gallon of motor fuel consumed. The vehicles in all States represented were placed on a comparable basis by classifying them by year of operation at the time the motor-vehicle allocation study was made rather than by year model. Passenger cars in their first year of operation averaged 12,980 miles while those in the second year of operation averaged 12,060 miles. During the third year the average annual mileage dropped to 10,620. From the first year throughout the 12th year the average annual mileage traveled shows a steady decrease. While data are available for vehicles which had been operated for more than 12 years they are not included in this tabulation. Vehicles which were operating for their 13th and a greater number of years reported annual mileage figures ranging from 50 to 5,000 miles. The number of questionnaires returned from owners in this group were too few to be considered of value for purposes of computing average annual mileage. Figure 9 presents the average annual mileage traveled by passenger cars, classified by year of operation.

There are several apparent reasons for this variation in annual mileage by vehicles of various ages. One of the most significant of these is the need for new cars in commercial operations. Passenger cars used for business purposes are usually driven a very high number of miles during the first and second years of operation and

TABLE 19.—Average annual mileage traveled and average number of miles traveled per gallon of gasoline consumed by passenger cars, by year of operation

Year of operation	Average mileage traveled during year ¹	Average number of miles traveled per gallon of gasoline consumed ²
First	12,980	16.1
Second	12,060	15.7
Third	10,620	15.6
Fourth	9,580	15.4
Fifth	8,820	15.0
Sixth	8,120	15.3
Seventh	7,500	15.5
Eighth	6,630	15.7
Ninth	5,950	15.6
Tenth	5,070	15.3
Eleventh	4,550	15.3
Twelfth	4,120	15.3

¹ Based on data from 35 States.

² Based on data from 30 States.

are then replaced with a new vehicle. Among private operators there is more interest shown in the operation of a relatively new vehicle and it is probable that owners of the newer vehicles make longer trips during the first few years of the life of the car. Frequently, new vehicles are purchased in anticipation of making a long vacation or business trip. During the first few years of the service life of a car, it is usually owned by a person whose income is adequate to operate it an annual mileage considerably higher than the average or it is used in a commercial operation which requires extensive usage. These vehicles are resold in the used-car market to purchasers in lower income groups with a consequent decrease in the annual mileage driven. As the vehicles become older and the resale price becomes less, persons in still lower income groups acquire them. The limited income of these groups permits only a limited use of vehicles resulting in low annual mileage.

Studies of the cost of automobile ownership⁶ indicate that the purchase of used cars by persons in the low-income group is much more common than the purchase of new cars. Only in the higher income groups were new car purchases more common than purchases of used cars. This study also points out the relatively small amount of money available for operation of automobiles by persons in the low-income group which results in relatively low average annual mileages.

RATE OF FUEL CONSUMPTION LITTLE AFFECTED BY VEHICLE AGE

Trucks and busses do not show the decrease in annual mileage during each successive year of their operation that is characteristic of passenger cars. These commercial vehicles are not subject to changes in model to the same extent as passenger cars. In commercial operations trucks and busses are usually maintained on a basis which will permit daily operation and adherence to regular schedules resulting in a fairly uniform amount of annual travel during the greater part of their lives. Frequently, new motor assemblies are installed in trucks and busses which enable them to be operated to the same extent as a new vehicle. For this reason, the year model of these vehicles was not considered to be of as much importance in determining gasoline consumption as it was in the case of passenger cars, and so was not obtained in all motor-vehicle allocation studies. Consequently, year-model data for

⁶ Family Expenditures in Selected Cities, 1935-36, vol. VI, United States Department of Labor, Bureau of Labor Statistics.

these vehicles are not available for a sufficient number of States to be presented in this study.

The average distance traveled per gallon of gasoline consumed, as shown in table 19, does not vary with the age of vehicles to the extent which might be expected. A greater number of miles per gallon of gasoline consumed was reported for vehicles in the first year of operation than in any other year. A steady decline in the number of miles per gallon of gasoline is noted for vehicles operated during the second, third, fourth, and fifth years. Older vehicles which were being operated for their sixth, seventh, eighth, or ninth year showed increases in the number of miles obtained per gallon of gasoline. Those vehicles which were being operated for the tenth and a greater number of years averaged 15.3 miles per gallon of gasoline consumed. Changes in motor design and the increase in efficiency of motors are factors which account for the variations in gasoline consumption rate. The discontinuance of the smaller size motors is probably an important factor also in the difference in the miles-per-gallon figure between the cars operating for their eighth year and those which had been in service only 5 years.

Table 20 shows the average annual mileages and the average motor-fuel consumption rates for passenger cars in each of the regions of the United States. The indicated variations are largely the result of average age, but are also influenced by such factors as climate, topography, industrial development, economic status, and density and distribution of population. Cars of a given age in one region may be driven more or less than cars of that same age in some other region, and in a particular region annual mileages for all cars may be high or low as compared with those in some other region. Table 20, for example, indicates higher annual mileages in the Southeast, Southwest, and Far West than in the Northeast, while table 21 indicates a lower average age in the Northeast than in any of the other regions. Nevertheless, average age is the major influence in determining annual mileage, perhaps because the other factors which influence annual mileage also directly influence average age. The influence of these other factors on motor-fuel consumption rates may be more pronounced, but in any event, variations in these rates are relatively small.

TABLE 20.—Average mileage traveled and average number of miles traveled per gallon of gasoline consumed by passenger cars in each of the regions of the United States during year of motor-vehicle study¹

Region	Average mileage traveled during year ²	Average number of miles traveled per gallon of gasoline consumed ³
Northeast.....	8,740	15.4
Southeast.....	9,070	15.7
Middle States.....	8,120	15.1
Northwest.....	7,200	16.1
Southwest.....	8,960	16.0
Far West.....	9,020	16.3
United States.....	8,530	15.5

¹ The majority of these studies were conducted during 1936.
² Based on data from 35 States.
³ Based on data from 30 States.

In only two States are data on average age of passenger cars available for all population groups but table 10 shows a marked difference in the average ages of cars in rural areas as compared with those in all incorporated

places in 15 States. It may be assumed that similar differences exist among the different groups of incorporated places, and tables 11 and 12 support this assumption, particularly as regards the larger and very small incorporated places. Undoubtedly, the high average age of passenger cars in rural areas largely explains the low average motor-fuel tax payments in those areas, although these low averages are influenced also by favorable motor-fuel consumption rates which exist in these areas.

TABLE 21.—Cumulative percentage distribution of passenger cars of different ages by regions

Region	Percentage of all passenger cars with an average age of—											
	1 year and less	2 years and less	3 years and less	4 years and less	5 years and less	6 years and less	7 years and less	8 years and less	9 years and less	10 years and less	11 years and less	All years
Northeast.....	Pct. 18.4	Pct. 29.8	Pct. 38.7	Pct. 45.5	Pct. 52.3	Pct. 62.1	Pct. 73.2	Pct. 85.4	Pct. 92.4	Pct. 95.9	Pct. 98.0	Pct. 100.0
Southeast.....	14.4	25.6	35.6	42.8	47.8	55.3	64.6	77.6	87.5	92.2	95.7	100.0
Middle States.....	11.7	21.0	27.7	32.6	39.3	48.8	63.8	77.1	85.5	91.5	95.4	100.0
Northwest.....	11.6	21.3	28.7	33.8	37.6	43.6	53.2	67.2	79.4	87.5	93.0	100.0
Southwest.....	12.3	21.5	28.7	33.0	38.3	47.6	63.7	78.0	86.0	92.0	95.9	100.0
Far West.....	14.6	25.2	31.7	36.9	40.4	47.3	56.7	70.4	79.6	86.1	91.8	100.0
United States.....	13.1	23.2	30.7	36.2	41.4	49.5	61.3	74.7	84.0	90.0	94.4	100.0

RELATIVE AVERAGE FUEL-TAX PAYMENTS LEAST FOR RESIDENTS OF UNINCORPORATED PLACES

The relative average motor-fuel tax rates per gallon in the different regions of the United States are shown in table 22 while table 23 shows the relative average motor-fuel taxes which would be paid by passenger-car owners in these regions if the tax rate were the same in all regions.

TABLE 22.—Relative motor-fuel tax rates in effect in 1939

Region	Relative motor-fuel tax rate
Northeast.....	0.931
Southeast.....	1.542
Middle States.....	.862
Northwest.....	1.018
Southwest.....	1.043
Far West.....	.875
United States.....	1.000

The tax rates per gallon indicated by table 22 are simple weighted averages computed by considering the several prevailing tax rates in each region and the number of gallons taxed at each prevailing rate in that region, and the indicated variations are actual existing variations. The effect of these varying tax rates has been eliminated in table 23 by assuming that the same tax rate per gallon exists in all regions so that the variations in this table are caused entirely by differences in annual mileages and in gasoline consumption rates. Both tables were prepared by assuming the value of the average of all population groups and all regions to be 1.000, and all other figures on the tables are ratios of that average.

Relative fuel tax rates per gallon according to table 22 vary from 0.862 in the Middle States to 1.542 in the Southeast with a range 0.680, but relative average fuel tax payments by residents of all places, according to table 23, vary from 0.816 in the Northwest to 1.070 in

TABLE 23.—Relative average motor-fuel taxes (1939) for passenger cars if same tax rate were in effect in all States (all places, all regions = 1.000)

Region	Unincorporated areas	Incorporated places having a population of—										Total	
		1,000 or less	1,001 to 2,500	2,501 to 5,000	5,001 to 10,000	10,001 to 25,000	25,001 to 50,000	50,001 to 100,000	100,001 to 250,000	250,001 to 500,000	500,001 to 1,000,000		More than 1,000,000
Northeast	0.878	0.918	0.963	1.010	1.034	1.096	1.077	1.065	1.060	1.017	1.118	1.031	1.016
Southeast	.837	1.055	1.062	1.085	1.053	1.105	1.078	1.111	1.188	1.051			.972
Middle States	.809	.918	.990	1.018	1.065	1.076	1.048	1.115	1.117	1.186	1.214	1.221	1.024
Northwest	.697	.800	.863	.875	.867	.923	.960	.968	.994	.948			.816
Southwest	.888	1.028	1.113	1.147	1.080	1.250	1.157	1.137	1.184	1.325			1.070
Far West	.910	.790	.923	.957	.996	1.016	1.041	1.064	1.004	.994	.980	1.142	.999
United States	.835	.919	.988	1.021	1.033	1.079	1.065	1.088	1.094	1.107	1.141	1.119	1.000

the Southwest, and the range, 0.254, is considerably less than in table 22, indicating that the differences in average motor-fuel tax payments among the several regions are caused largely by the different tax rates in those regions.

Table 23 also indicates that the relative average motor-fuel tax payments by residents of the several population groups in a particular region vary considerably, even after the effects of the different motor-fuel tax rates have been eliminated. These average fuel tax payments for residents of all regions vary from 0.835 in unincorporated areas to 1.141 in incorporated places with a population of from 500,001 to 1,000,000 persons, with a range of 0.306. This range is larger than the corresponding range among regions, and it is evident that the influence of annual mileages and gasoline consumption rates on average motor-fuel tax payments is greater in the case of population group variations than in the case of regional variations. If the Northwest region with its very low relative average motor-fuel tax payments were disregarded, these variations among population groups would be even more decided as compared with those among regions. The differences in motor-fuel tax rates among the population groups of a particular region are very small, being occasioned only by the fact that all States in the region are not proportionally represented in all population groups, and these differences are minimized by the fact that the States in any one region do not have widely varying motor-fuel tax rates.

On the basis of tables 22 and 23, it may be concluded that, in general, there are significant differences in average motor-fuel tax payments between population groups in the same region and that these differences are largely the result of differences in annual mileages and gasoline consumption rates. Differences between regions, on the other hand, are primarily the result of different tax rates, although these differences, too, are influenced by mileage and consumption rates. For example, the relatively low motor-fuel tax payments for unincorporated areas as compared with other population groups shown in table 17, which presents actual rather than theoretical average motor-fuel tax payments and where variations are due not only to different annual mileages and consumption rates but also to varying tax rates, are the result of relatively low annual mileages driven by rural residents and, in the case of trucks, of relatively high mileage per gallon of gasoline due to the high percentage of light trucks in rural areas. The high average payments throughout all population groups of the Southeast region, however, are undoubtedly the result of high motor-fuel tax rates in that region.

SOUTHEAST REGION HAD HIGHEST AVERAGE FUEL TAXES

Table 17 further indicates that the highest average annual motor-fuel tax payment for passenger cars was the \$40.60 paid by residents of places having a population of 100,001 to 250,000 persons in the Southeast region, and that the lowest average motor-fuel tax payment for passenger cars was the \$14.52 paid by residents of unincorporated areas in the Middle States. The \$40.60 figure is largely the result of the high motor-fuel tax rates in the Southeast region, although it is also influenced by mileage and consumption rates, but the \$14.52 figure is apparently very largely influenced by mileage because residents of the Far West, and the Northeast, with only slightly higher motor-fuel tax rates, both pay much higher average motor-fuel taxes, the corresponding amounts being \$16.95 and \$17.52, respectively. The highest average annual motor-fuel tax paid for trucks was the \$90.56 paid by residents of places having a population of 100,001 to 250,000 in the Southeast region, the same population group which paid the highest average motor-fuel tax payment for passenger cars. The lowest average motor-fuel tax payment for trucks was the \$20.51 paid by residents of unincorporated areas in the Northwest region.

The \$25.68 average motor-fuel tax paid for passenger cars by residents of unincorporated areas in the Southeast is lower than that paid for passenger cars by residents of any other population group in that region but, nevertheless, is higher than the highest average motor-fuel tax paid for passenger cars by the residents of any population group in the Northeast, Middle States, Northwest, or Far West, the highest average motor-fuel taxes paid for passenger cars in these regions being \$22.09, \$23.07, \$20.62, and \$22.50, respectively. The difference between this low average tax of \$25.68 in unincorporated areas in the Southeast and the next higher average tax for passenger cars in that region, \$33.22, is relatively large as compared with similar differences in other regions. The same situation exists in the case of trucks and the \$45.91 average motor-fuel tax paid for trucks by residents of unincorporated areas in the Southeast, although lower than that paid for trucks by residents of any other population group in that region is, except in a very few instances, higher than the highest average motor-fuel tax paid for trucks by residents of any population group in any of the other regions.

In the case of busses, however, the average motor-fuel taxes paid by residents of the different population groups in the Southeast region are not consistently high as compared with corresponding taxes in the other regions, and in fact the \$209.68 average motor-fuel tax paid for busses by residents of all places in the Southeast region

is lower than the \$211.05 average motor-fuel tax paid for busses by residents of all places in the United States. This condition is caused by the very large number of school busses that are included in the smaller places in the Southeast, which because of their relatively large number (table 1) and low annual mileage as compared with other busses, affect to a considerable degree the average motor-fuel taxes paid for busses by residents of those places. No doubt equally large numbers of school busses exist in the smaller places of the other regions, but because of different registration practices they are registered as passenger cars or trucks or as publicly owned vehicles, and so are not included as busses. In the larger places, however, except in those having a population of from 250,001 to 500,000 persons, the average motor-fuel taxes paid in the Southeast are larger than the corresponding taxes paid in the other regions.

In contrast with the high average motor-fuel taxes paid by residents of the Southeast region are those paid by residents of the Northwest region (table 17) where the average motor-fuel taxes paid for either passenger cars or trucks by residents of all places are lower than the corresponding taxes paid in any other region. Apparently these relatively low average motor-fuel taxes paid by residents of the Northwest region are almost entirely the result of low annual mileages in that region, since the Far West, the Northeast and the Middle States all have lower average motor-fuel tax rates and since the variation in consumption rates between regions, particularly for passenger cars, is slight. It might be noted as regards the individual population groups, however, that in the case of passenger cars in no single group are the average motor-fuel taxes paid in the Northwest lower than those paid in any of the other regions, and in the case of trucks only in unincorporated areas are the Northwest taxes low, so that in the Northwest region there must be less variation in annual mileages among the different population groups than exists in the other regions.

Just as average motor-fuel taxes paid depend on annual mileages, motor-fuel consumption rates, and the tax rate per gallon, so in turn total motor-fuel taxes paid depend on these same things and also on the total number of vehicles involved. Table 16 indicates, for

example, that for all regions as a unit, and for both passenger cars and trucks, the second largest total motor-vehicle fuel taxes paid by residents of any population group are those paid by residents of incorporated places having a population of over 1,000,000 persons, although places of this size exist in only three of the six regions on which the tabulations are based; table 1 in turn indicates that more vehicles are registered in incorporated places having a population of over 1,000,000 persons than in any other place except unincorporated areas. The largest total motor-fuel taxes paid are those paid by residents of unincorporated areas, which taxes amount to about 2½ times as much as do those paid by residents of incorporated places having a population of over 1,000,000 persons; about 2½ times as many vehicles are registered in unincorporated areas as are registered in incorporated places having a population of over 1,000,000 persons. The smallest total motor-fuel taxes paid by residents of any population group are those paid by residents of incorporated places having a population of from 500,001 to 1,000,000 persons and fewer vehicles are registered in this population group than in any other.

ONE-FOURTH OF MOTOR-FUEL TAXES PAID BY RESIDENTS OF UNINCORPORATED AREAS

The relations between total motor-fuel taxes paid by residents of different population groups are further developed by table 24 which presents by population groups and regions a percentage distribution of total motor-fuel taxes paid in the United States in 1939. The motor-fuel taxes paid for passenger cars by residents of unincorporated areas in all regions amount to 25.8 percent of the taxes paid for passenger cars by all residents in all regions, which compares with the 28.7 percent of total passenger cars registered in unincorporated areas (see table 2) and the 26.4 percent of total motor-vehicle registration fees paid for passenger cars by residents of those areas in all regions (see table 14). For the individual regions the percentage of total motor-fuel taxes paid for passenger cars by residents of unincorporated areas varies from 16.8 in the Northeast to 38.7 in the Southeast, while the percentage of total passenger cars registered owned by residents of unincorporated areas varies from 18.5 in the Northeast to

TABLE 24.—Percentage distribution of State motor-fuel taxes paid on fuel used in passenger cars and trucks in 1939, by population groups

PASSENGER CARS																
Region	Unincorporated areas	Incorporated places having a population of—												All places	Non-resident	Total
		1,000 or less	1,001 to 2,500	2,501 to 5,000	5,001 to 10,000	10,001 to 25,000	25,001 to 50,000	50,001 to 100,000	100,001 to 250,000	250,001 to 500,000	500,001 to 1,000,000	More than 1,000,000				
Northeast.....	16.8	2.3	4.3	5.4	6.0	11.8	8.2	6.7	7.5	4.2	7.0	19.7	99.9	0.1	100.0	
Southeast.....	38.7	5.5	6.5	6.2	6.1	7.9	5.7	7.3	7.8	8.1	7.0	19.7	99.8	.2	100.0	
Middle States.....	21.3	6.1	5.5	4.8	5.7	7.6	7.0	6.4	5.4	10.8	6.8	12.5	99.9	.1	100.0	
Northwest.....	35.3	10.4	8.7	5.7	6.7	10.6	4.2	3.5	9.3	5.5	-----	-----	99.9	.1	100.0	
Southwest.....	30.8	3.6	6.8	6.4	7.5	8.9	6.6	4.0	12.7	12.1	-----	-----	99.4	.6	100.0	
Far West.....	24.2	2.2	3.3	4.1	5.3	8.7	5.3	6.8	6.3	11.6	4.6	17.4	99.8	.2	100.0	
United States.....	25.8	4.6	5.4	5.4	6.0	9.2	6.6	6.4	7.4	8.4	4.2	10.4	99.8	.2	100.0	

TRUCKS																
Northeast.....	16.4	2.9	4.6	4.5	5.1	9.8	6.5	7.7	7.4	4.4	9.5	20.9	99.7	0.3	100.0	
Southeast.....	38.8	6.3	7.2	6.9	6.0	8.5	5.5	6.6	7.3	5.5	-----	-----	98.6	1.4	100.0	
Middle States.....	18.1	8.2	6.2	4.9	5.6	7.1	6.8	5.9	5.8	9.6	6.5	14.9	99.6	.4	100.0	
Northwest.....	34.5	12.7	10.5	6.6	6.9	11.4	3.4	2.7	6.8	3.6	-----	-----	99.1	.9	100.0	
Southwest.....	29.6	3.9	7.9	8.2	8.3	9.2	7.1	3.9	8.1	11.8	-----	-----	98.0	2.0	100.0	
Far West.....	23.7	4.3	5.8	5.8	7.1	8.3	5.0	5.0	5.0	9.5	5.7	14.4	99.6	.4	100.0	
United States.....	26.2	6.0	6.6	5.9	6.1	8.7	6.0	6.0	6.8	7.1	4.2	9.6	99.2	.8	100.0	

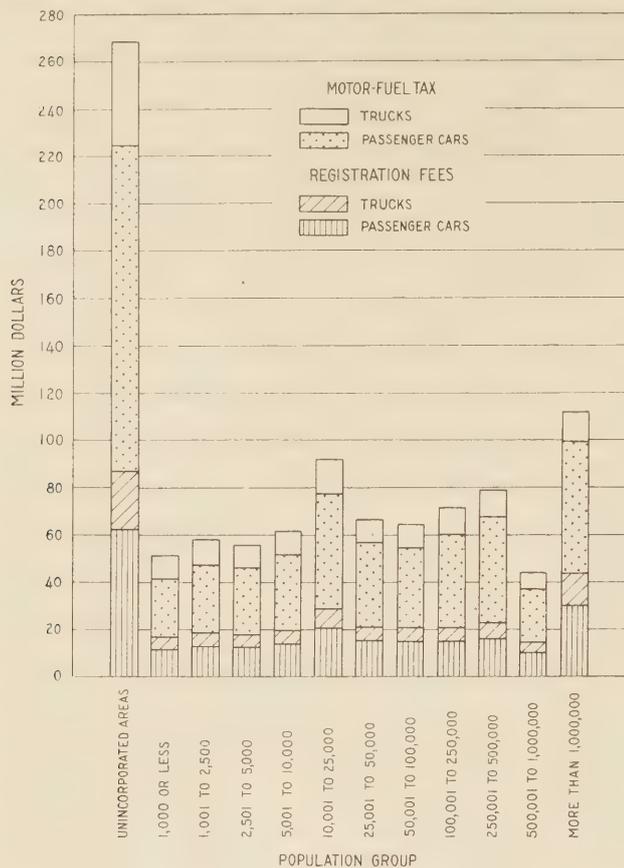


FIGURE 10.—REGISTRATION FEES AND MOTOR-FUEL TAXES PAID BY OWNERS OF PASSENGER CARS AND TRUCKS IN 1939.

46.0 in the Southeast and the percentage of total motor-vehicle registration fees paid for passenger cars paid by residents of unincorporated areas varies from 18.8 in the Northeast to 43.4 in the Southeast.

The influence of vehicle age on total motor-fuel tax collections is indicated by table 25 which compares on a percentage basis total gasoline consumption and total registration of passenger cars of different ages. For passenger cars 5 years of age and less, the percentage of total gasoline consumption is higher for each age group than the corresponding percentage of total registration, while for passenger cars 6 years of age and older, the percentage of total gasoline consumption is lower for each age group than the corresponding percentage of total registration. Cars 5 years of age and less use 55.5 percent of the total gasoline consumed by all cars but constitute only 41.4 percent of the total registration. These percentages, of course, vary in the different regions at any particular time, and because of shifts in ownership of vehicles and movements of large numbers of used cars from one section of the country to another, they vary from time to time in a particular region. Nevertheless, in any region and at any time, the effect of the age of vehicles in operation upon gasoline consumption appears to be relatively important, since the motor-fuel tax is the most important single tax source for highway purposes.

Table 26 presents data on average combined fees, which are simply a combination of average registration fees and average motor-fuel taxes. The relative importance of average combined fees cannot be over-

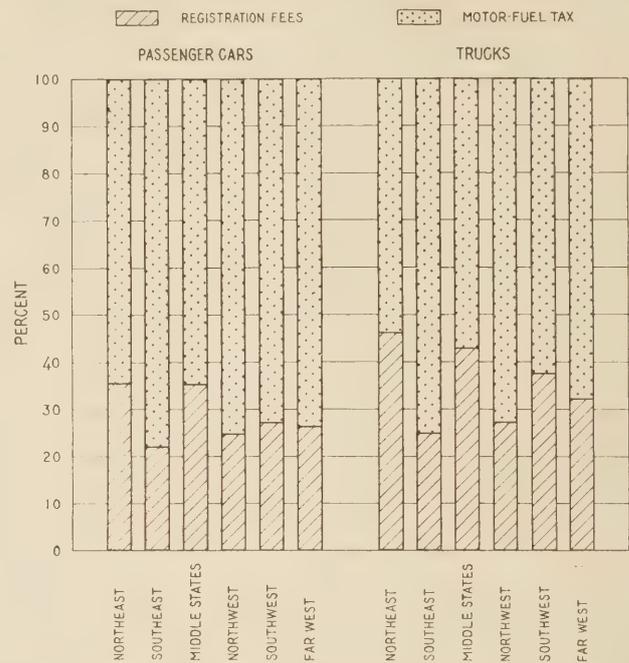


FIGURE 11.—RELATIVE REGISTRATION FEES AND MOTOR-FUEL TAXES PAID BY OWNERS OF MOTOR VEHICLES IN THE SEVERAL REGIONS IN THE UNITED STATES.

emphasized because they represent what the average motorist pays for the privilege of operating his vehicle. Registration fees or motor-fuel taxes alone are not particularly significant because both must be paid, and it is the sum of the two which represents the motorists' outlay. Consequently, it may be stated that the tabulation of average combined fees indicates what are undoubtedly the most significant results of the present study.

TABLE 25.—Percentage distribution of total gasoline consumption by passenger cars of each age classification and percentage distribution of passenger car registration

Age, years	Gasoline consumption		Registration	
	Percentage of total	Cumulative percent	Percentage of total	Cumulative percent
1.....	19.6	19.6	13.1	13.1
2.....	14.4	34.0	10.1	23.2
3.....	9.5	43.5	7.5	30.7
4.....	6.3	49.8	5.5	36.2
5.....	5.7	55.5	5.2	41.4
6.....	7.9	63.4	8.1	49.5
7.....	10.6	74.0	11.8	61.3
8.....	10.5	84.5	13.5	74.8
9.....	6.6	91.1	9.3	84.1
10.....	3.7	94.8	6.0	90.1
11.....	2.4	97.2	4.4	94.5
12 and older.....	2.8	100.0	5.5	100.0
All.....	100.0		100.0	

It is apparent from table 26 that average combined fees are influenced much more by average motor-fuel taxes than they are by average registration fees. The average combined fees, for example, are highest in the Southeast, just as the average motor-fuel taxes are highest in that region, whereas the average registration fees are highest in the Northeast and are relatively low in the Southeast. Figures 10 and 11 show for each region the actual and relative amounts, respectively, of registration fees and motor-fuel taxes paid by residents

TABLE 26.—Combined average vehicle registration fees and average State motor-fuel taxes paid in 1939

PASSENGER CARS

Region	Unincorporated areas	Incorporated places having a population of—											All places	Non-resident	Total
		1,000 or less	1,001 to 2,500	2,501 to 5,000	5,001 to 10,000	10,001 to 25,000	25,001 to 50,000	50,001 to 100,000	100,001 to 250,000	250,001 to 500,000	500,001 to 1,000,000	More than 1,000,000			
Northeast	\$28.39	\$29.80	\$29.97	\$30.32	\$29.64	\$30.63	\$28.39	\$29.93	\$27.60	\$24.01	\$30.87	\$34.74	\$30.00	\$31.90	\$30.00
Southeast	33.89	41.64	41.98	43.69	42.47	43.92	43.40	43.67	51.23	41.80	-----	-----	39.21	41.40	39.21
Middle States	23.67	25.98	27.11	28.12	28.42	29.22	28.91	29.17	30.50	32.64	31.51	29.06	27.76	29.07	27.77
Northwest	19.87	22.28	23.69	23.67	24.40	25.12	27.31	25.53	25.11	25.03	-----	-----	22.52	28.16	22.52
Southwest	26.72	29.61	31.99	33.20	31.25	35.54	34.30	33.69	33.56	37.91	-----	-----	31.22	26.24	31.18
Far West	22.93	23.08	23.54	23.49	23.61	24.33	24.27	23.79	24.61	-----	22.47	25.01	24.13	25.10	24.14
United States	26.70	28.33	29.94	30.80	30.11	30.93	30.22	30.98	31.51	31.62	29.89	30.88	29.48	30.29	29.48

TRUCKS

Northeast	53.26	55.08	57.03	58.65	60.96	61.42	59.55	71.53	62.79	58.88	73.85	82.01	64.16	92.04	64.26
Southeast	61.35	85.16	86.58	89.36	86.90	94.80	97.31	89.46	118.22	75.24	-----	-----	76.30	95.70	76.56
Middle States	39.59	51.98	53.76	55.70	59.64	63.65	69.19	71.47	80.98	74.46	67.63	94.81	59.39	83.15	59.48
Northwest	29.46	47.15	52.03	55.29	51.07	58.04	48.45	49.67	49.41	47.48	-----	-----	40.33	75.89	40.61
Southwest	37.05	53.42	57.75	63.84	62.03	65.37	70.25	63.75	57.03	89.39	-----	-----	53.12	62.30	53.33
Far West	37.93	45.92	46.72	46.33	46.01	49.14	48.66	47.17	56.00	65.61	58.31	55.41	47.59	55.00	47.62
United States	45.43	56.65	59.86	62.86	62.36	66.01	67.57	71.43	72.10	71.05	69.00	81.61	59.99	79.13	60.14

BUSES

Northeast	172.85	215.44	210.59	206.60	197.35	269.67	306.44	305.95	327.01	234.02	347.30	516.17	315.40	329.18	316.58
Southeast	105.82	117.91	114.16	181.80	299.33	419.52	524.25	410.05	710.15	308.05	-----	-----	257.96	367.68	264.79
Middle States	108.83	130.91	214.40	276.48	337.88	303.79	401.95	423.97	383.62	482.27	378.37	441.34	350.60	543.38	364.35
Northwest	178.76	94.45	143.73	114.06	230.53	344.73	258.28	339.25	404.43	295.01	-----	-----	240.77	336.63	250.50
Southwest	289.05	130.11	169.63	329.95	338.94	320.54	384.82	315.57	451.94	497.76	-----	-----	405.81	339.20	400.29
Far West	106.22	187.50	176.47	208.47	143.71	215.66	208.90	132.12	316.44	364.45	125.43	203.69	190.09	208.83	190.21
United States	121.71	137.38	167.06	208.72	232.25	312.11	339.74	340.13	408.07	338.43	248.74	426.97	288.77	361.42	293.74

of the different regions. In view of the relatively large amounts of fuel taxes as compared with registration fees, it is to be expected that the combined fees would show the same tendencies as do the fuel taxes.

The influence of average fuel taxes on average combined fees may be further illustrated by ranking numerically for the several regions average registration fees, average fuel taxes, and average combined fees for all population groups. The result of such ranking for passenger cars is indicated in table 27 which clearly shows that the influence of average motor-fuel taxes is more pronounced than that of average registration fees on average combined fees. Wherever there is a difference in the ranking of a particular region in the case of average registration fees as compared with average fuel taxes, its ranking in the case of combined fees is the same as in the case of fuel taxes.

TABLE 27.—Numerical rank of average registration fees, average fuel taxes, and average combined fees for passenger cars, by regions

[All population groups]

Region	Average registration fees	Average fuel taxes	Average combined fees
Northeast	1	3	3
Southeast	3	1	1
Middle States	2	4	4
Northwest	6	6	6
Southwest	4	2	2
Far West	5	5	5

In the case of individual population groups, however, it is not always true that combined average fees tend to follow average fuel taxes rather than average registration fees. Table 28 presents for unincorporated areas only the same rankings as are presented in table 27 for all population groups, but whereas in table 27 all regions rank the same as regards average fuel taxes

and average combined fees, in table 28 only the Southeast ranks the same as regards average fuel taxes and average combined fees. In the Northwest and Far West, average registration fees and average combined fees rank the same, and in the other regions average combined fees rank midway between average registration fees and average fuel taxes.

TABLE 28.—Numerical rank of average registration fees, average fuel taxes, and average combined fees for passenger cars, by regions

[Unincorporated areas]

Region	Average registration fees	Average fuel taxes	Average combined fees
Northeast	1	3	2
Southeast	3	1	1
Middle States	2	6	4
Northwest	6	5	6
Southwest	4	2	3
Far West	5	4	5

RANGES IN MOTOR-FUEL TAXES AND REGISTRATION FEES COMPARED

Table 27 shows further that average registration fees and average fuel taxes as they exist in the different regions tend to equalize the average combined fees in those regions. Residents of the Northeast and Middle States, for example, pay the highest average registration fees, whereas residents of the Southeast and Southwest pay the highest fuel taxes. Residents of the Northwest and Far West, on the other hand, pay both the lowest average registration fees and also the lowest average fuel taxes. In other words, the highest average combined fees are somewhat less than they would be if the highest average registration fees and also the highest average fuel taxes were paid by residents of the same region or regions, but are not as low as they might be if the lower fees and taxes were

more widely distributed throughout the different regions.

This particular situation may also be demonstrated by comparing the ranges or the differences between the high and low of average motor-vehicle registration fees, average motor-fuel taxes, and average combined fees. On a regional basis and for all population groups as a unit average motor-vehicle registration fees for passenger cars vary from \$5.60 in the Northwest to \$10.72 in the Northeast with a range of \$5.12, while average motor-fuel taxes vary from \$16.92 in the Northwest to \$30.52 in the Southeast with a range of \$13.60, and average combined fees vary from \$22.52 in the Northwest to \$39.21 in the Southeast with a range of \$16.69. In the case of trucks average motor-vehicle registration fees vary from \$10.83 to \$29.49 with a range of \$18.66, while average motor-fuel taxes vary from \$29.50 to \$57.48 with a range of \$27.98 and average combined fees vary from \$40.33 to \$76.30 with a range of \$35.97. If residents of the same region paid the highest existing average registration fee for passenger cars of \$10.72 and the highest average existing motor-fuel tax for passenger cars of \$30.52 they would pay an average combined fee of \$41.24, whereas the highest average combined fee paid by residents of any region for passenger cars was actually \$39.21, or somewhat less than the theoretical maximum. Similarly, the theoretical maximum range of average combined fees for passenger cars is \$5.12 plus \$13.60 or \$18.72, whereas the actual existing range of average combined fees for passenger cars is \$16.69.

That the combination of average motor-vehicle registration fees and average motor-fuel taxes tends to decrease the range and the actual amounts of the average combined fees paid by residents of a particular locality can be demonstrated on a population-group basis as well as on a regional basis. In the case of passenger cars, for example, average registration fees paid by residents of all regions vary from \$8.38 in unincorporated areas to \$10.95 in incorporated places having a population of more than 1,000,000 persons, or a range of \$2.57, while average motor-fuel taxes vary from \$18.32 to \$23.15, or a range of \$4.83, and average combined fees vary from \$26.70 to \$31.62, or a range of \$4.92. Although these ranges are considerably smaller than those existing between regions, the maximum theoretical range of \$2.57 plus \$4.83 or \$7.40 is considerably more than the actual range of \$4.92. Likewise, the maximum theoretical combined average fee for all groups is \$10.95 plus \$23.15 or \$34.10, whereas the highest existing combined fee is \$31.62. Apparently the tendencies between individual population groups toward more stable average combined fees than the maximums theoretically possible are the same as those existing between regions.

A final fact which may be noted in connection with average combined tax contributions is that where the average contribution for all population groups existing in a particular region is high or low as compared with that existing in other regions, the average contributions in each individual population group of that region are not necessarily high or low as compared with similar contributions in corresponding population groups of the other regions. The lowest average combined fee for passenger cars for all population groups, for example, is the \$22.52 paid by residents of the Northwest, but in the individual population groups the average combined contribution of residents of the Northwest is lower than

that of residents of other regions in only three instances, the contributions of residents of the Far West being lower in the other seven instances. Similar variations exist in other regions and for the other vehicle types. Although such variations are neither unusual nor unexpected, they are worthy of notice in an analysis of data where the primary interest is in population-group relationships.

SUMMARY

In connection with this primary interest in population-group relationships, it will be recalled that the particular purpose of the present study is to present by population groups data on motor-vehicle registrations, motor-vehicle registration fees, and motor-fuel taxes. Such data have not previously been available on such a basis. In developing these data, numerous significant relationships as regards the ownership and operation of vehicles in the different population groups have been indicated. A few of the general conclusions which may be drawn from the data presented and analyzed are listed in the following paragraphs:

1. Although 40.2 percent of all vehicles in the United States are owned by persons residing in unincorporated areas and in incorporated cities and towns having a population of less than 2,500 persons, these persons constitute 43.6 percent of the total population of the country.

2. In unincorporated areas alone, however, 35.5 percent of the population of the country owned only 29.6 percent of the motor vehicles registered in 1939.

3. Of the total population of the United States, 47.5 percent resided in incorporated places having a population of less than 500,000 persons. The residents of these places owned 55.9 percent of the total number of vehicles registered in 1939.

4. The number of passenger cars registered per 100 persons varies from a maximum of 53.2 in incorporated places having a population of from 50,001 to 100,000 persons in the Far West to a minimum of 10.2 in unincorporated areas in the Southeast. In general, the number of cars per 100 persons in unincorporated areas and in cities having a population of more than 500,000 persons is low as compared with those in incorporated places having a population of less than 500,000 persons.

5. The average age of passenger cars owned by residents of unincorporated areas generally exceeds the average age of passenger cars owned in incorporated places by 1 to 2 years.

6. Average registration fees for all types of vehicles owned in unincorporated areas are lower than the average registration fees of vehicles owned in the incorporated cities and towns; vehicle owners living in cities having a population of more than 1,000,000 persons paid the highest average registration fees of any population group.

7. The average motor-fuel tax payments by residents of the different population groups in a particular region vary considerably, even after the effects of the different motor-fuel tax rates have been eliminated, such variations being due to differences in annual mileages and gasoline consumption rates.

8. The average motor-fuel tax payments by residents of the different regions vary considerably, but these variations, although influenced to a certain extent by differences in annual mileages and gasoline consumption rates, are largely the result of different motor-fuel tax rates.

9. The Southeast region which had the highest relative gasoline tax rate also had the highest average annual mileage reported for passenger cars.

10. Passenger cars 5 years of age and less use 55.5 percent of the total gasoline consumed by all cars but constitute only 41.4 percent of the total passenger-car registration.

11. Average combined fees are influenced much more by average motor-fuel taxes than by average registration fees, which is to be expected in view of the relatively large amounts of fuel taxes as compared with registration fees.

12. Although average combined fees are widely variable, just as are average registration fees and average motor-fuel taxes, the variation in the case of combined fees is not quite so extreme as would be theoretically possible, the fees being somewhat stabilized by the particular way in which the different average registration fees and average motor-fuel taxes are distributed among the different regions and population groups.

APPENDIX

Population and motor-vehicle registration data were not available for the year 1940 during the period in which this study was made. Since its completion the motor-vehicle registration data for that year have become available. Also, the population enumeration for the 1940 Census has been completed. Availability of these materials has made it possible to present tabulations which show the distribution of motor vehicles by States and population groups for the year 1940. Three tabulations have been prepared. They are:

- A.—Distribution of privately owned automobiles by population groups in the United States in 1940.
- B.—Distribution of privately owned trucks by population groups in the United States in 1940.
- C.—Distribution of all privately owned vehicles by population groups in the United States in 1940.

TABLE A.—Distribution of privately owned automobiles by population groups in the United States in 1940

State	Unincorporated areas	Automobiles owned by residents of—									All places
		Incorporated places having a population of—									
		2,500 or less	2,501 to 5,000	5,001 to 10,000	10,001 to 25,000	25,001 to 50,000	50,001 to 100,000	100,001 to 250,000	250,001 to 500,000	More than 500,000	
	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Alabama.....	123,098	23,192	14,995	15,149	19,658	13,441	24,609		38,972		273,114
Arizona.....	51,299	5,886	5,409	12,854		13,504	23,993				112,945
Arkansas.....	95,096	23,709	15,198	13,193	21,023	5,480	16,890				190,589
California.....	588,331	68,051	86,144	147,631	202,900	168,956	216,117	186,991	85,955	702,882	2,453,958
Colorado.....	73,857	43,341	17,216	18,372	23,916	12,971	12,503		90,450		292,626
Connecticut.....	111,591	3,551	3,170	5,833	49,061	100,084		115,078			416,656
Delaware.....	23,544	8,084	5,656	1,446				21,479			60,209
Florida.....	105,333	29,267	25,720	24,713	47,359	39,728	18,537		123,066		413,723
Georgia.....	165,421	41,971	22,920	23,263	36,790	5,064	47,760		69,250		412,439
Idaho.....	62,990	18,977	4,696	4,696	21,721	7,587					129,454
Illinois.....	314,429	171,349	76,680	114,138	130,569	145,156	143,643	29,967		580,708	1,706,639
Indiana.....	315,470	90,438	30,700	56,071	58,241	76,560	61,389	74,511	93,148		856,528
Iowa.....	218,853	171,143	52,976	44,637	41,864	48,593	69,201	43,990			691,257
Kansas.....	166,428	93,468	35,929	28,631	64,240	10,342	19,660	61,304			480,002
Kentucky.....	208,160	30,291	15,136	21,090	13,963	33,135	9,922		55,371		387,068
Louisiana.....	94,299	21,926	14,545	19,645	13,965	19,433	25,433		71,417		280,663
Maine.....		59,468	24,863	23,619	27,531	11,611	14,700				161,792
Maryland.....	165,973	25,263	14,599	7,842	20,693	14,264				135,340	383,974
Massachusetts.....		40,134	48,022	73,525	145,789	143,443	102,230	140,586			96,583
Michigan.....	287,267	137,376	69,204	84,520	105,793	107,286	109,276	82,163		417,953	1,400,838
Minnesota.....	244,563	132,123	34,968	52,763	47,299	7,339		20,442	206,792		746,289
Mississippi.....	110,272	21,226	11,791	10,549	24,315	6,662	11,663				480,002
Missouri.....	225,570	103,189	38,866	43,666	65,103	19,309	26,412		81,774	164,456	768,345
Montana.....	65,795	19,411	8,399	10,357	22,275	16,831					143,068
Nebraska.....	134,128	75,672	17,634	15,250	25,944		25,851	52,838			347,317
Nevada.....	14,983	3,190	2,765	5,976	8,350						35,264
New Hampshire.....		40,379	12,701	7,732	20,077	11,989	12,156				105,034
New Jersey.....	156,648	54,017	47,561	85,661	127,850	142,645	93,544	97,938	138,766		944,630
New Mexico.....	32,885	8,400	6,412	17,139	16,444	13,254					94,534
New York.....	467,747	99,886	79,824	70,556	167,898	89,883	90,179	109,557	58,840	1,165,126	2,399,496
North Carolina.....	216,301	82,641	29,393	30,746	48,790	28,233	48,048	19,342			503,494
North Dakota.....	76,161	34,734	1,841	10,267	13,487	9,256					145,746
Ohio.....	478,097	137,778	68,671	107,108	134,813	123,185	67,460	173,281	251,851	186,031	1,728,275
Oklahoma.....	154,828	62,848	25,158	37,700	66,104	16,270		104,191			467,099
Oregon.....	129,630	42,341	18,674	16,548	19,548	8,885			89,504		325,130
Pennsylvania.....	523,592	148,258	131,343	173,654	235,129	92,042	147,858	65,096		360,523	1,877,495
Rhode Island.....		3,597	10,466	13,605	20,129	59,481	17,199		41,864		166,341
South Carolina.....	148,810	31,144	19,777	19,139	22,448	17,667	30,103				289,088
South Dakota.....	68,248	41,369	9,383	12,542	18,984	12,726					163,252
Tennessee.....	158,019	25,373	23,373	22,639	23,047	4,809		68,050	52,006		377,316
Texas.....	445,395	109,143	82,587	91,086	99,418	66,718	120,968	43,928	283,618		1,342,861
Utah.....	23,347	21,729	10,619	5,696	6,144	10,370		39,121			117,026
Vermont.....	41,692	13,327	3,804	11,642	6,765	6,692					83,922
Virginia.....	266,425	20,981	12,483	16,307	12,248	23,880	24,088	46,179			422,591
Washington.....	186,226	46,481	21,919	11,206	33,064	22,468		59,805	91,879		473,048
West Virginia.....	110,296	30,930	13,452	17,708	22,354	17,247	41,307				250,294
Wisconsin.....	215,927	114,990	45,884	36,305	61,030	112,809	34,455			129,553	750,953
Wyoming.....	23,752	13,398	4,329	4,302	20,832						66,613
District of Columbia.....										146,612	146,612
Total.....	7,890,776	2,645,440	1,386,642	1,698,717	2,434,965	1,914,288	1,735,442	1,778,903	1,801,457	4,085,767	27,372,397

TABLE B.—Distribution of privately owned trucks by population groups in the United States in 1940

State	Trucks owned by residents of—										All places
	Unincorporated areas	Incorporated places having a population of—									
		2,500 or less	2,501 to 5,000	5,001 to 10,000	10,001 to 25,000	25,001 to 50,000	50,001 to 100,000	100,001 to 250,000	250,001 to 500,000	More than 500,000	
Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Alabama	30,919	6,108	3,624	3,217	4,206	2,877	4,607		7,289		62,847
Arizona	12,582	1,358	1,312	3,099		1,283	5,474				25,108
Arkansas	34,977	10,003	5,592	4,462	6,415	1,332	3,377				66,158
California	74,540	19,714	19,064	29,044	28,459	21,441	22,716	15,689	8,669	80,365	319,701
Colorado	21,288	9,533	3,928	3,492	4,096	1,972	1,963		12,046		58,318
Connecticut	34,427	759	630	998	7,457	11,756	4,003	15,809			75,839
Delaware	4,852	1,492	908	219				4,083			11,554
Florida	23,992	5,932	5,750	4,752	7,599	6,685	3,089	21,991			79,790
Georgia	38,634	10,799	4,760	4,652	7,514	1,036	8,115		11,672		87,182
Idaho	19,478	5,373	3,349	1,109	3,464	985					33,758
Illinois	50,679	31,165	11,040	13,799	15,415	15,670	13,521	3,408		64,478	219,175
Indiana	53,210	18,272	5,390	9,356	9,002	9,948	8,271	9,116	13,592		136,157
Iowa	22,355	30,540	9,591	7,861	7,136	7,936	10,436	6,857			102,712
Kansas	43,744	20,161	6,635	5,257	9,931	2,070	3,619	11,016			102,433
Kentucky	42,806	6,623	3,390	3,815	2,811	6,596	1,331		8,519		75,891
Louisiana	41,212	6,792	4,336	5,810	3,566	3,503	3,734		12,840		81,793
Maine		19,038	6,360	6,216	6,047	2,867	3,386				43,914
Maryland	26,893	4,585	1,834	879	2,423	2,166				20,642	59,422
Massachusetts		9,079	8,325	12,189	21,409	15,187	13,141	17,718			108,642
Michigan	29,614	20,875	7,829	9,679	12,282	11,514	10,033	9,048		40,001	150,875
Minnesota	50,365	24,741	5,647	8,674	7,388	1,140		2,774	23,734		124,463
Mississippi	37,544	6,887	3,415	2,895	6,665	1,280	2,241				60,927
Missouri	42,905	23,000	8,841	8,461	11,389	3,319	5,517		13,928	32,666	150,026
Montana	32,247	4,200	1,637	2,236	4,271	3,373					47,964
Nebraska	27,148	15,198	3,665	2,974	4,449		3,403	7,649			64,489
Nevada	3,692	1,415	589	1,250	1,789						8,735
New Hampshire		14,339	3,681	2,005	5,019	2,438	2,580				30,062
New Jersey	25,537	7,807	5,859	9,892	15,656	17,519	15,572	14,724	24,560		137,126
New Mexico	12,035	2,872	1,982	4,412	4,749	3,211					29,261
New York	68,183	13,038	8,673	7,325	18,400	9,868	13,423	14,798	9,311	172,742	335,761
North Carolina	31,211	15,789	5,555	6,086	10,134	5,860	9,142	3,680			87,457
North Dakota	20,017	8,437	416	2,481	3,320	1,713					36,384
Ohio	53,457	17,715	7,745	12,102	13,735	11,920	4,307	19,378	28,587	21,708	190,654
Oklahoma	43,906	14,497	5,599	7,693	13,028	3,171		16,934			104,828
Oregon	34,401	10,854	4,103	3,238	3,730	1,459			9,971		67,756
Pennsylvania	79,126	19,194	14,874	19,164	27,374	10,265	22,903	9,363		60,492	262,755
Rhode Island		584	1,606	1,884	2,602	6,189	1,737		6,115		20,717
South Carolina	19,925	5,839	3,989	3,973	4,194	3,265	5,221				46,406
South Dakota	13,534	8,827	1,921	2,261	3,791	1,864					32,298
Tennessee	30,897	5,994	5,099	4,552	3,819	672		12,039	7,595		70,667
Texas	132,457	33,543	26,665	28,085	28,222	16,649	25,261	8,353	51,205		350,440
Utah	5,138	5,337	2,485	1,105	1,385	1,533		5,251			22,234
Vermont	5,390	1,477	334	1,092	671						9,628
Virginia	54,230	2,677	1,600	2,511	2,033	3,797	3,371	6,028			76,247
Washington	46,426	10,532	4,332	1,921	4,542	3,123		7,552	9,806		85,234
West Virginia	22,417	5,497	2,344	3,555	4,411	2,725	10,571				51,520
Wisconsin	58,924	30,706	10,162	6,631	8,269	15,004	4,049			15,506	149,251
Wyoming	9,363	3,769	1,042	782	3,943						18,899
District of Columbia										13,928	13,928
Total	1,566,677	552,966	257,510	289,145	378,210	258,945	250,114	243,258	259,439	534,122	4,590,386

The basic materials used in the preparation of the population group distribution of vehicles for the year 1939 were used in preparing the 1940 tabulations. In the computation of the 1940 data the population of each group for 1940 was divided by the number of persons per vehicle in 1939 for that group except that for those individual places which had sufficient increase or decrease in population to cause a shift to a new classi-

fication the original ratio of persons per vehicle, based on the previous census, was used. The computed number of vehicles in each population group when totaled was of course at variance with the known registration totals for each State. This difference was eliminated by applying an adjustment factor uniformly to each population group in each State.

(Continued on p. 261)

SUBSTITUTION OF PAINT COATINGS FOR METALLIC ZINC COATINGS

By E. F. HICKSON, Chemist, National Bureau of Standards

This bulletin is issued at the request of the Protective and Technical Coatings Section of the Office of Production Management in the interest of conservation. The object is to suggest substitutes that at the time of writing are available to replace critical materials.

IN numerous ways zinc is vital to the nation's defense program. Thus for nondefense purposes, an increasing number of inquiries are being received with regard to suitable substitutes for the zinc coating formerly used on various iron and steel surfaces. This article will be confined to the use of organic protective coatings as possible substitutes for metallic zinc coatings.

As is the case with many other materials which are critical during the present National Emergency, no paint has all the desirable properties of the ordinary hot-dip galvanized or zinc-coated surfaces on steel, including such properties as resistance to abrasion, resistance to corrosion, weathering, relative freedom from cracking, chipping, peeling and scaling of the types encountered with paint coatings, etc. On the other hand, in a highly polluted industrial atmosphere, certain acid-resisting and water-resisting paints are advantageous.

Thus since the environment and other external factors have such a pronounced effect on the durability of both paint and metallic zinc coatings, only general statements can be made in this memorandum. Frequently painting systems have to be devised so as to cover each individual case. Thus any general procedure or recommendation may not cover a specific situation. It is with this thought in mind that the following suggestions are made.

Factory-primed exterior sheet steel formerly zinc-coated (roofing, flashings, etc.).—Since much of the work referred to herein will be done at the shop where the metal is rolled and fabricated, the priming paints to be employed for this purpose should be industrial finishes purchased by the steel manufacturer directly from the industrial finish manufacturer. Special industrial primers for preventing corrosion of black iron have been developed and are readily available. They generally consist of rust-inhibitive pigments such as red lead, white lead, blue lead, metallic lead, zinc oxide, with or without various percentages of chromate pigments, often combined with iron oxide pigments. They are usually ground in quick-drying varnish liquids. The articles are either sprayed or dipped with these primers. While they may air-dry rapidly, they are usually baked in suitable ovens. Baking for a relatively short period produces a hard, dry surface which may be handled, thus expediting production in the factory. On the other hand, where the objects are to be coated in the field by the user, the slower-drying types of primers, such as red lead in oil and similar rust-inhibitive primers, may be used.

The industrial finish manufacturer has also worked out special priming liquids and finishes for the interiors and exteriors of drums which are to hold certain industrial liquids such as oils, etc. These primers are usually baked on by the drum manufacturer, thus making them very much more resistant to various liquids. For those having problems of this character, it is suggested that they immediately get in touch with a reliable manufacturer of industrial finishes.

If the sheet steel is painted at the factory, it may be given a chemical treatment followed by a baked-on, high-grade priming paint. Sheet steel coated with vitreous or glass coating is also available. In connection with the chemical surface treatment, reference should be made to BMS Report 44, "Surface Treatment of Steel Prior to Painting," of the National Bureau of Standards. A copy of this report can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 10 cents. In this report, it was found that among surface treatments for plain steel subjected to accelerated weathering, salt spray, and condensation corrosion tests, the hot-dip phosphate treatments showed outstanding merit in improving the protective value of paints. Particularly effective protection was obtained when such treatments were used under severely corrosive conditions in combination with a primer of the inhibitive type. Two phosphate-chromate cold-wash treatments for plain steel also appeared to improve paint protection.

It is essential that the primer be baked on at proper temperatures and under proper operating conditions. It is also essential that the primer be of high-grade quality and that it be not thinned excessively on the job. As has been mentioned, the primer should contain rust-inhibitive pigments and the vehicle should be of a suitable baking type. Finish coat paints of the desired color may be applied on the job. For example, finish coats of white or light tint paints may be obtained under Federal Specifications TT-P-36a,¹ TT-P-156, and TT-P-101a; red and brown iron oxide paints under Federal Specification TT-P-31a, black paint under Federal Specification TT-P-61; and green paint under Federal Specification TT-P-71a.

Painting exterior sheet metal on the job formerly zinc-coated (roofing, flashings, window and louver heads, etc.).—The problem here is to have a sheet that must stand exposure to ordinary storage, handling, and fabrication, and then be able to be welded or soldered and subsequently painted. One Government agency specifies that for exterior sheet metal work for roof flashings and flashing at door, window, and louver heads the materials shall be either phosphate-treated steel or terne plate. It also specifies that the surfaces that are to be painted shall be thoroughly cleaned and all traces of flux removed. The steel shall be 26 gage, phosphate-treated, and given immediately a dip-coat of mineral oxide paint baked on at a temperature of 250° to 300° F. Both sides of phosphate-treated steel and all exposed surfaces of other sheet metal work, flashings, etc. (except copper), shall be painted with one coat of red lead and oil paint before placing. The red lead paint shall comply with Federal Specification TT-P-86.

Painting interior sheet steel formerly zinc-coated (air ducts, etc.).—The same recommendations of pretreating the steel prior to applying a baked-on, high-grade, rust-

¹ A table giving the complete designation of the Federal Specifications referred to herein will be found at the end of this article (p. 261).

inhibitive primer may be followed. However, for certain places where the surface is not to be exposed to the weather, the application of a bituminous base coating (F. S. SS-R-451) may serve the purpose. However, it should be required that this coating dry hard and free of tackiness. In the case of air ducts that become hot, it is suggested that instead of the above-described bituminous base coating, the ducts be dipped in asphalt varnish (F. S. TT-V-51). This will produce a coating that will bake on the surface at a temperature of 300° to 400° F. Special heat-resisting enamels in black and gray colors are also available. These enamels will withstand temperatures considerably above 400° F.

Painting exterior structural steel (girders, towers, etc.), formerly zinc-coated.—After priming the clean surface with a rust-resisting primer such as a red lead paint (F. S. TT-P-86), basic lead chromate paint (F. S. TT-P-59), blue lead paint (F. S. TT-P-20), etc., use a finish coat of gray paint or any other tint conforming to Federal Specification TT-P-36a or TT-P-156. If chalk-resistant titanium oxide is specified, Federal Specification TT-P-101a, or War Department Cantonment Paint, Standard Specification 8000 E, page 88, June 30, 1941, may also be used, tinted gray or any other desired color. If color is of no moment, dark-colored paints such as iron oxide (F. S. TT-P-31a) or black (F. S. TT-P-61) will be more durable than white or light tint paints. Additional information on painting structural steel may be found in the National Bureau of Standards Letter Circular 422, "The Painting of Structural Metal."

Painting interior structural steel formerly zinc-coated.—In industrial plants where good light reflection from the structural steel is desired, the following procedure may be used. Apply a priming coat of quick-drying red lead paint (Procurement Division Specification No. 358), or a similar rust-inhibitive primer, followed by either two coats of eggshell flat white paint (F. S. TT-P-51a) or gloss white enamel, sometimes called "gloss mill white," (F. S. TT-E-506a). The enamel will be more water-resistant and more durable. For special conditions where fumes are encountered, such as in chemical laboratories, bakeries, tobacco factories, cafeterias, etc., a special enamel known as fume-and-heat-resisting enamel (National Bureau of Standards Letter Circular 489) may be used.

Painting steel surfaces formerly zinc-coated for subsoil or under-water exposure.—Bituminous base coatings are suggested for this purpose. The following paragraphs give some of the properties of these coatings:

(A) *Cold or brush application type.*

(1) *Solutions of either asphalt or coal tar in a volatile distillate.*—These coatings are of brushing consistency and are primarily intended for use as primers on surfaces which are subsequently to be coated with a hot application of asphalt. (See F. S. SS-A-701.) This type of material is also commonly used on surfaces where a black coating is desired, which will not be subjected to the action of heat or sunlight. These materials are known commercially as black or liquid asphaltum, bituminous paint, primers, etc.

(2) *Asphalt varnish or enamels.*—These materials are composed of a high-grade asphalt fluxed and blended with properly treated drying oils and thinned to a brushing consistency with a volatile solvent. (See F. S. TT-V-51.) Special types of this material will withstand dry temperatures up to 600° F. (see U. S. Navy Specification 52-E-2a, Enamel, Black, Heat-Resisting).

These coatings in general are more durable than those listed under (1). They are primarily intended for use indoors as coatings for surfaces where a hard, black glossy surface is desired. They will, for a limited time, give adequate protection against moisture and corrosive vapors. They should not be used where they are alternately exposed to sunlight and moisture. These materials are known commercially as asphalt varnish, asphalt enamel, and heat-and-acid-resisting enamel.

(3) *Cold mastic type.*—These coatings consist of asphaltic materials (with or without fatty oils) and mineral filler, thinned to a heavy brushing consistency with a volatile solvent. (See F. S. SS-R-451.) This material is intended for use in the repair and coating of asphalt and metal roofing and for application to concrete, masonry, and steel structures as a dampproofing and protective coating.

(B) *Hot application type.*

(1) Asphalt, F. S. SS-A-666.

(2) Coal tar, F. S. R-P-381.

(3) Bituminous enamels.

A description of the characteristics and methods of application of these materials can be found beginning on page 3 of the National Bureau of Standards Letter Circular 42, "Acid-Proof Coatings for Concrete Surfaces." Reference should also be made to National Bureau of Standards Research Paper 1058, issued December 1937, "Soil-Corrosion Studies, 1934, Bituminous Coatings for Underground Service." This publication can be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 10 cents.

Painted wire formerly zinc-coated.—The problem here is to suggest a paint that will be an acceptable substitute for galvanized wire screen (1-inch mesh) used in reinforcing stucco in home construction. Probably the best method would be to have the work done at the finishing plant, where the black iron screen could be passed through a tank of black, flexible enamel or japan, and then baked in suitable drying ovens prior to shipping the screen in rolls. This coating would be tough and flexible and would not chip off. The necessity of having some kind of a coating on the black iron is to prevent rust stains from "bleeding" through the stucco and paint after the building is erected. A cheaper but not as durable a method is to dip the roll of black iron screen being used on the job in a tank of a bituminous solution as described on page 259. This material would dry quickly, and since the amount of bituminous coating on any one wire would be relatively small, it is doubtful whether there would be any trouble from the bitumen "bleeding" through the stucco. Another possibility is to dip the roll in a quick-drying, thin spar varnish.

General considerations.—As can be seen from the foregoing remarks, it is possible to use Federal Specification materials or their equivalents as substitutes for zinc-coated surfaces under a variety of conditions. Recommending the use of synthetic resin paints and enamels has been avoided, because of the shortage of certain ingredients used in these paints. The same statement holds true for aluminum paint. Similarly, certain highly durable cellulosic finishes could be employed, but an acute shortage of the plasticizers and solvents for these is also developing.

As has been noted previously, the condition to which the surface is exposed has a direct influence on the durability of the paint coating. Thus a coating that

may show excellent resistance under water (for example a bituminous coating) may fail rather quickly when exposed to the weather.

In using paint to replace galvanized or zinc coatings, it should be kept in mind that the condition of the surface is of utmost importance. It should be clean, dry, and free of all rust and scale prior to painting. Within practical limits, the protective value of a paint film is roughly proportional to its thickness. Thus for exterior exposure the safest procedure is to apply three coats of good paint, each coat being spread at a practical spreading rate (500 to 700 square feet per gallon). Where exposure conditions are particularly severe (for example an outside roof), it is suggested that two coats of primer and two coats of the finish paint be applied.

Equally important as the character of the surface and the thickness of paint film on the ultimate durability is the method of application. There is no substitute for skill in application. This is at least as important as the quality of the paint. It is for these reasons that the only proper method of evaluating a paint job is on the basis of cost of paint per square foot area applied per year of service.

Wherever Federal Specifications are referred to in this memorandum, they cover products which will be satisfactory for the use referred to, but for the general buying public similar products may be obtained under trade brands at any paint store throughout the country.

The paint dealer will readily recognize the material referred to.

Complete titles of Federal specifications referred to in body of the article are given below. Copies of these specifications are available from the Superintendent of Documents, Government Printing Office, Washington D. C. at 5 cents each.

Federal Specification No.	Title
TT-P-20	Paint, blue-lead-base; basic sulfate, linseed oil, ready-mixed.
TT-P-31a	Paint; iron-oxide, ready-mixed and semipaste, red and brown.
TT-P-36a	Paints; lead-zinc-base, ready-mixed, and semipaste, white and tinted.
TT-P-51a	Paints; oil, interior, eggshell-flat-finish, ready mixed and semipaste, light tints and white.
TT-P-59	Paint, ready-mixed, international-orange.
TT-P-61	Paint; ready-mixed and semipaste, black.
TT-P-71a	Paint; ready-mixed and semi-paste, exterior, chrome-green.
TT-P-86	Paint, red-lead-base; linseed-oil, ready-mixed.
TT-P-101a	Paint; titanium-zinc and titanium zinc-lead, outside, ready-mixed, white.
TT-P-156	Paint, white-lead-base; basic carbonate, ready-mixed, light-tints and white.
TT-E-506a	Enamel; interior, gloss, light-tints and white.
TT-V-51	Varnish; asphalt.
SS-A-666	Asphalt; (for) built-up roofing, waterproofing, and dampproofing.
SS-A-701	Asphalt-primer; (for) roofing and waterproofing.
SS-R-451	Roof-coating; asphalt, brushing-consistency.
R-P-381	Pitch; coal-tar (for) mineral-surfaced built-up roofing, waterproofing, and dampproofing.

(Continued from p. 258)

TABLE C.—Distribution of all privately owned vehicles by population groups in the United States in 1940¹

State	Unincorporated areas	Vehicles owned by residents of—									All places
		Incorporated places having a population of—									
		2,500 or less	2,501 to 5,000	5,001 to 10,000	10,001 to 25,000	25,001 to 50,000	50,001 to 100,000	100,001 to 250,000	250,001 to 500,000	More than 500,000	
	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number	Number
Alabama	158,260	30,212	19,051	18,826	24,824	16,974	30,428	47,553			346,128
Arizona	65,693	7,643	7,040	16,415		16,972	30,153				143,916
Arkansas	135,337	35,686	21,904	18,527	28,806	7,264	21,797				269,321
California	711,039	101,424	117,872	196,265	249,323	203,479	253,116	212,321	98,648	814,002	2,957,489
Colorado	96,254	53,577	21,400	22,126	28,252	15,133	14,648				355,192
Connecticut	149,555	4,471	3,948	7,021	58,008	113,687	33,023	132,708	26,674		502,421
Delaware	29,789	10,005	7,135	1,835							75,438
Florida	133,638	38,644	34,247	31,371	57,792	48,449	22,523	150,642			517,306
Georgia	211,885	55,397	28,744	28,800	45,970	6,345	58,208		83,848		136,123
Idaho	93,703	27,917	19,162	6,592	28,858	9,891					519,197
Illinois	372,725	207,011	89,458	130,277	148,621	163,616	159,738	33,967		656,479	1,961,822
Indiana	396,505	118,101	39,120	70,870	72,896	93,986	75,653	90,665	116,553		1,074,349
Iowa	245,669	240,222	74,808	62,309	57,177	64,683	90,398	57,679			892,945
Kansas	212,677	114,971	43,060	34,285	75,095	12,565	23,557	73,309			589,519
Kentucky	251,807	37,085	18,610	25,027	16,845	39,966	11,360		64,285		464,985
Louisiana	141,667	32,583	20,741	27,188	18,456	23,940	30,212		85,923		380,710
Maine		82,498	33,980	31,785	35,380	15,288	18,762				217,693
Maryland	195,994	30,561	16,758	8,882	23,519	16,886				159,193	451,793
Massachusetts		51,057	58,203	88,107	171,813	162,411	117,831	161,450		110,033	920,905
Michigan	359,866	181,519	86,658	107,737	131,845	132,530	131,962	102,424		483,555	1,718,096
Minnesota	337,603	173,101	44,407	67,175	59,862	9,281		24,887	247,740		963,956
Mississippi	151,520	29,289	15,717	13,825	31,922	8,160	14,283				264,716
Missouri	277,405	136,276	50,855	54,947	80,201	23,540	33,241		99,883	206,505	962,853
Montana	100,861	24,359	10,369	13,936	27,465	20,747					197,737
Nebraska	191,304	96,977	22,750	19,432	32,298						458,388
Nevada	19,173	4,908	3,462	7,706	10,510				31,055	64,572	45,759
New Hampshire		56,690	18,957	10,062	26,043	15,240	15,248				142,240
New Jersey	184,912	62,843	54,145	96,900	145,759	163,223	111,088	114,910	166,377		1,100,157
New Mexico	45,981	11,729	8,721	29,486	22,202	17,199					128,318
New York	548,602	115,713	90,282	79,516	190,555	102,311	106,295	128,362	70,006	1,373,469	2,805,111
North Carolina	272,731	107,990	37,411	38,692	62,079	36,060	59,342	23,889			638,194
North Dakota	96,492	43,533	2,292	12,886	17,237	11,278					183,718
Ohio	610,340	169,238	81,843	126,800	157,112	141,755	73,526	201,109	292,656	214,046	2,068,425
Oklahoma	198,869	78,580	31,247	46,185	81,767	20,039					583,558
Oregon	164,825	53,774	23,073	20,009	23,395	10,332			100,003		395,411
Pennsylvania	618,186	171,266	148,993	196,630	268,022	104,439	174,675	76,247		431,499	2,189,957
Rhode Island		4,254	12,241	15,689	23,002	66,361	19,107		48,791		189,445
South Carolina	172,329	38,183	24,447	23,641	27,194	21,551	36,174				343,519
South Dakota	95,850	55,574	12,145	15,900	24,467	15,595					219,531
Tennessee	189,006	31,485	28,567	27,325	27,021	5,512		80,663	60,045		449,624
Texas	598,736	147,971	113,567	124,364	132,384	86,492	151,551	54,135	345,353		1,754,553
Utah	28,689	27,488	13,338	6,876	7,608	12,025		45,047			141,071
Vermont	48,904	15,229	4,175	12,996	7,586	7,503					96,393
Virginia	326,216	24,426	14,873	19,874	15,040	29,060	28,731	55,464		106,515	513,714
Washington	243,254	59,910	27,682	13,874	39,708	26,964					588,761
West Virginia	134,588	37,371	16,247	21,680	27,396	17,375		52,967			307,624
Wisconsin	278,303	147,758	56,808	43,550	70,118	129,426	38,979				911,465
Wyoming	38,351	19,303	5,965	5,536	27,112						96,267
District of Columbia											163,501
Total	9,935,023	3,405,802	1,736,478	2,092,737	2,938,545	2,265,533	2,069,631	2,108,849	2,137,981	4,758,805	33,449,384

¹ Includes automobiles, trucks, tractor-trucks, busses, trailers, semitrailers, and motorcycles.

STATUS OF FEDERAL-AID HIGHWAY PROJECTS
AS OF DECEMBER 31, 1941

STATE	COMPLETED DURING CURRENT FISCAL YEAR			UNDER CONSTRUCTION			APPROVED FOR CONSTRUCTION			BALANCE OF BUDGET AVAILABLE FOR FISC. YEAR ENDING 6/30/42
	Estimated Total Cost	Federal Aid	Miles	Estimated Total Cost	Federal Aid	Miles	Estimated Total Cost	Federal Aid	Miles	
Alabama	3,222,587	1,602,075	109.7	7,152,099	3,550,720	231.1	509,310	252,900	2.9	680,197
Arkansas	969,381	693,221	44.7	1,827,239	1,194,046	64.0	384,502	254,599	8.4	717,071
California	3,447,372	1,585,912	56.6	1,168,870	583,318	59.8	70,984	35,492	.3	158,258
Colorado	6,616,026	3,508,870	110.5	5,426,924	2,939,466	67.1	2,488,150	1,254,696	42.6	1,223,897
Connecticut	2,310,848	1,303,814	154.6	3,188,693	1,833,313	150.4	1,432,135	633,083	40.6	822,930
Delaware	1,419,554	696,181	17.1	1,715,156	821,787	18.4	481,435	239,471	9.4	527,175
Florida	275,227	132,707	4.9	749,827	371,718	21.2	268,040	134,020	8.4	987,558
Georgia	1,167,179	582,330	65.3	2,281,618	1,144,037	17.9	1,332,477	642,238	17.9	1,970,717
I Idaho	2,513,841	1,270,628	84.5	6,707,932	3,321,308	264.5	3,921,308	1,960,654	166.5	4,582,888
Illinois	1,751,600	1,067,364	93.7	1,222,674	754,224	45.4	171,449	106,007	17.8	949,436
Indiana	3,447,506	1,715,162	80.2	5,338,007	2,768,382	131.0	1,445,417	722,548	6.4	3,193,851
Iowa	4,482,275	2,073,573	73.8	5,349,003	2,595,736	76.2	2,191,200	1,095,600	32.7	3,158,255
Kansas	2,682,185	1,265,745	107.5	5,321,802	2,372,708	189.8	809,741	97,650	23.6	37,324
Kentucky	3,862,380	1,921,896	217.1	2,421,429	1,171,326	228.1	2,822,284	886,446	103.1	2,126,981
Louisiana	3,498,959	1,732,580	118.6	6,152,435	3,133,886	143.8	2,216,538	1,044,355	13.1	1,511,197
Maine	850,231	425,091	28.3	1,997,922	990,543	39.7	2,553,917	1,251,767	56.2	3,052,377
Maryland	958,577	474,582	28.6	1,831,602	944,301	19.6	313,400	156,700	8.2	253,884
Massachusetts	2,737,267	1,367,529	29.6	3,436,096	1,467,649	15.0	467,000	17,500	17.5	767,505
Michigan	7,348,774	1,177,018	17.3	3,252,103	1,142,862	14.9	1,173,468	583,147	8.4	2,601,239
Minnesota	1,137,708	3,605,211	184.2	3,456,700	1,713,399	39.1	1,822,709	240,768	18.8	621,668
Mississippi	4,417,901	2,195,411	377.6	9,154,372	4,128,372	387.8	4,823,087	2,400,768	21.1	730,332
Missouri	3,600,044	1,797,394	208.8	5,304,224	2,597,712	286.5	191,500	94,000	6.1	525,491
Montana	5,079,259	2,515,015	160.1	10,026,526	4,385,652	190.0	2,382,972	493,509	36.5	3,018,258
Nebraska	2,181,671	1,233,971	117.1	3,428,246	1,948,238	150.8	905,844	519,282	78.3	2,564,676
Nevada	1,606,528	788,385	204.2	6,499,968	3,068,939	552.6	709,046	354,523	37.8	2,178,588
New Hampshire	2,251,656	1,520,341	110.6	7,421,339	3,843,031	22.0	571,686	238,767	2.4	98,469
New Jersey	339,179	166,213	6.0	1,238,815	595,091	14.8	470,053	232,580	5.4	504,113
New Mexico	2,854,311	1,424,881	26.5	3,065,908	1,532,874	16.2	23,910	11,955	12.9	1,756,886
New York	1,234,207	759,224	94.9	1,125,166	718,439	68.3	352,949	228,216	14.9	1,294,397
North Carolina	8,779,082	4,333,586	117.1	8,380,493	4,655,345	88.2	1,517,372	837,804	14.9	1,039,199
North Dakota	2,817,624	1,497,647	124.6	3,818,419	1,912,049	157.7	1,179,540	555,855	27.8	1,386,838
Ohio	3,223,082	1,774,691	287.2	2,500,840	1,251,218	223.1	2,173,340	1,377,050	20.8	2,781,622
Oklahoma	8,253,694	4,276,497	84.6	11,394,492	5,356,331	73.1	2,058,000	2,377,468	40.4	1,148,045
Oregon	1,986,316	996,008	99.3	2,656,022	1,401,557	49.1	2,116,780	1,108,399	77.1	3,989,082
Pennsylvania	2,139,084	1,288,406	65.2	3,720,608	1,992,888	73.4	264,054	170,881	7.5	1,708,881
Rhode Island	8,243,356	4,091,634	82.4	5,793,781	4,811,703	75.6	3,618,747	1,768,991	30.9	818,401
South Carolina	1,136,944	566,510	10.9	644,476	232,768	4.8	1,767,583	215,966	28.0	559,217
South Dakota	2,573,734	1,297,897	71.5	4,570,410	2,327,569	102.2	791,600	464,010	84.8	1,022,850
Tennessee	2,017,802	1,167,128	239.0	5,035,343	3,257,569	567.6	1,791,600	1,464,010	84.8	1,308,213
Texas	3,148,138	1,572,084	92.2	3,796,626	1,898,313	64.4	4,096,096	1,743,350	131.6	2,043,469
Utah	2,260,673	1,047,246	437.4	12,541,069	6,022,306	431.3	2,239,644	1,138,710	11.0	3,190,577
Vermont	1,094,161	522,026	51.4	1,821,437	1,372,192	38.8	36,906	18,457	5.3	1,085,245
Virginia	819,705	400,394	28.3	1,231,974	562,327	70.2	36,906	18,457	5.3	1,085,245
Washington	2,319,701	1,162,308	52.3	4,231,492	1,962,727	70.2	838,252	23,400	1.0	654,000
West Virginia	1,328,015	692,995	18.9	2,956,655	1,581,504	38.3	43,686	23,400	1.0	654,000
Wisconsin	2,183,960	1,089,365	44.7	2,950,912	1,459,318	37.7	463,776	229,588	3.4	1,091,344
Wyoming	2,142,882	1,052,779	89.4	5,604,011	2,626,343	167.1	1,410,013	486,400	47.4	2,394,795
District of Columbia	1,411,312	1,814,626	148.3	1,814,626	1,182,446	123.5	31,546	20,284	1.1	2,269,156
Hawaii	594,036	227,515	3.3	721,662	296,682	1.1	478,895	114,708	5.2	201,857
Puerto Rico	1,237,526	128,068	3.2	2,093,029	1,003,604	9.2	230,632	114,708	5.2	1,377,246
TOTALS	143,460,804	73,808,292	5066.8	208,665,493	105,1754,649	5,989.5	62,231,880	28,734,072	1,576.5	66,343,064

STATUS OF FEDERAL-AID SECONDARY OR FEEDER ROAD PROJECTS

AS OF DECEMBER 31, 1941

STATE	COMPLETED DURING CURRENT FISCAL YEAR			UNDER CONSTRUCTION			APPROVED FOR CONSTRUCTION			BALANCE OF FUNDS AVAILABLE FROM GRANTED PROJECTS
	Estimated Total Cost	Federal Aid	Miles	Estimated Total Cost	Federal Aid	Miles	Estimated Total Cost	Federal Aid	Miles	
Alabama	\$ 1,115,122	\$ 555,768	38.0	\$ 752,602	\$ 399,640	49.7	\$ 255,259	\$ 121,280	6.1	\$ 216,314
Arizona	121,340	88,202	13.2	141,552	105,006	.8	126,598	61,439	6.3	292,556
Arkansas	599,245	230,013	33.1	294,368	147,118	21.3	189,486	94,743	5.1	43,888
California	628,196	376,840	15.2	1,089,399	784,093	10.7	152,387	35,323	5.0	381,181
Colorado	150,002	84,134	20.7	129,755	72,649	2.1				216,644
Connecticut	298,035	136,331	6.1	286,247	115,937	4.8				85,891
Delaware	83,272	39,496		222,731	110,890	12.3	102,873	37,617	3.9	160,439
Florida	498,886	249,443	4.7	666,633	338,767	7.1	191,500	95,662	5.9	137,172
Georgia	249,325	158,662	31.7	1,302,120	743,410	79.5	496,986	242,498	50.8	666,014
Idaho	261,313	170,467	26.2	190,271	111,744	7.7	78,125	48,303	5.9	91,951
Illinois	932,510	482,147	51.4	1,210,660	605,330	55.3	151,700	72,600	17.7	213,460
Indiana	354,450	177,225	22.4	1,345,255	659,471	84.1	189,600	94,800	6.4	505,028
Iowa	525,803	247,570	125.8	473,357	205,568	87.3	324,069	152,325	60.5	159,071
Kansas	452,187	228,579	75.3	1,935,172	969,753	120.9	499,225	249,613	37.7	592,532
Kentucky	970,242	264,219	64.4	1,265,879	293,993	50.9	344,462	91,400	14.1	110,785
Louisiana	564,708	230,289	20.6	7,700	3,850		289,362	138,761	21.5	443,106
Maine	77,540	36,770	3.6	235,218	117,609	10.5	16,850	2,714	.4	9,491
Maryland	368,000	184,000	19.1	434,000	216,825	3.5				202,116
Massachusetts	179,789	93,569	4.1	634,608	334,371	10.1	437,170	218,585	14.2	361,339
Michigan	960,380	474,650	64.7	911,300	455,650	33.4	414,504	192,444	39.8	108,569
Minnesota	1,411,025	710,872	189.7	1,062,233	533,924	104.6	377,200	130,024	19.6	128,837
Mississippi	712,594	396,297	35.2	1,181,867	547,275	92.8	260,942	100,486	41.0	176,649
Missouri	364,178	180,434	42.9	912,206	438,515	95.4	45,312	25,784	11.8	534,181
Montana	377,420	214,407	53.5	241,662	137,374	23.7				551,659
Nebraska	326,809	164,896	40.7	497,029	253,128	60.1	53,654	26,827	22.5	334,621
Nevada	224,935	194,692	24.1	92,413	60,816	4.6	99,973	79,290	4.5	3,198
New Hampshire	152,914	75,336	4.7	237,331	95,284	3.6				91,572
New Jersey	330,780	165,310	5.6	940,902	287,910	16.0	82,910	41,455	1.8	353,335
New Mexico	408,981	255,920	42.6	346,212	223,860	20.2				12,307
New York	947,602	480,644	28.8	894,946	465,214	44.3	430,066	208,533	1.5	300,660
North Carolina	224,260	112,130	23.2	648,577	354,343	48.0	69,820	20,000	5.0	259,761
North Dakota	29,802	15,664	2.4	3,434	3,434		808,050	793,860	42.7	496,795
Ohio	1,669,162	833,445	56.1	885,150	490,545	11.2	177,160	88,580	6.7	771,575
Oklahoma	326,340	177,384	19.2	91,422	48,270	12.4	903,706	477,457	64.2	685,266
Oregon	463,457	243,324	41.8	459,611	217,324	28.5	30,482	18,000	1.3	115,964
Pennsylvania	1,110,416	554,650	21.3	1,397,243	688,113	26.7	73,588	36,794	1.8	54,611
Rhode Island	220,879	111,427	2.6	14,694	10,697					53,098
South Carolina	461,656	170,066	44.9	539,900	214,224	10.2				165,627
South Dakota	32,430	18,006	15.2	3,622	3,622		1,143,430	1,047,600	114.5	490,587
Tennessee	333,033	164,824	10.8	1,430,720	715,360	48.5	190,926	95,463	5.3	405,325
Texas	908,673	429,508	101.5	890,849	430,390	73.5	295,100	144,000	25.0	1,134,698
Utah	186,949	123,240	17.0	136,491	75,150	3.5	23,035	15,255	3.3	151,695
Vermont	36,231	18,109	1.2	180,204	59,279	7.8	46,514	23,257	1.1	3,059
Virginia	373,443	174,585	15.8	246,346	154,866	4.4	157,496	74,348	6.6	308,679
Washington	217,653	120,202	11.8	484,988	242,414	13.7				135,718
West Virginia	310,300	155,150	15.5	419,833	211,423	10.7				309,250
Wisconsin	475,208	387,179	32.0	1,700,988	756,713	52.7	76,438	37,300	.8	139,427
Wyoming	360,882	155,250	18.8	511,240	220,929	34.3				2,582
District of Columbia		39,924	.9	2,558	1,279					76,120
Hawaii				2,375	2,375					249,562
Puerto Rico		51,430	6.4	125,732	61,425	4.2				134,883
TOTALS	23,053,435	11,369,682	1,581.5	29,831,565	14,797,239	1,417.6	9,665,968	5,441,000	682.8	13,649,478

STATUS OF FEDERAL-AID GRADE CROSSING PROJECTS

AS OF DECEMBER 31, 1941

STATE	COMPLETED DURING CURRENT FISCAL YEAR				UNDER CONSTRUCTION				APPROVED FOR CONSTRUCTION				BALANCE OF FUNDS AVAILABLE FOR PROJECTS		
	Estimated Total Cost	Federal Aid	NUMBER		Estimated Total Cost	Federal Aid	NUMBER		Estimated Total Cost	Federal Aid	NUMBER				
			Grade Eliminated by Separation or Relocation	Grade Projected Since Construction of Other			Grade Eliminated by Separation or Relocation	Grade Projected Since Construction of Other			Grade Eliminated by Separation or Relocation	Grade Projected Since Construction of Other			
Alabama	\$ 109,856	\$ 109,336	1	3	\$ 395,225	\$ 393,203	6	2	\$ 92,335	\$ 92,335	2	1	\$ 721,500		
Arizona	154,715	154,386	5	1	309,635	300,914	1	2	13,255	13,255	2	2	1,011,598		
Arkansas	603,990	418,274	2	3	1,699,639	1,679,929	8	1	31,907	31,907	1	11	3,317,203		
California	3,282	163,615	2	2	1,095,774	1,089,801	7	1	15,678	15,678	5	5	1,521,783		
Colorado	166,222	163,115	2	2	664,232	664,232	7	1	21,912	21,912	10	10	471,872		
Connecticut	166,222	163,115	2	2	61,712	60,175	7	1	251,574	252,710	1	1	398,210		
Delaware	4,300	4,300	1	1	278,123	276,691	2	1	508,106	321,785	2	2	76,504		
Florida	92,071	92,071	7	1	736,439	734,259	8	6	206,316	206,285	3	4	582,765		
Georgia	512,535	512,535	7	1	932,235	932,235	5	7	971,699	971,699	3	19	1,015,950		
Idaho	20,101	17,928	5	2	325,915	317,214	4	1	6,212	6,212	1	3	261,709		
Illinois	181,159	151,511	2	7	2,159,132	1,976,197	3	1	128,731	109,781	3	3	1,513,688		
Indiana	132,063	119,575	5	17	583,089	583,089	3	1	153,096	147,387	3	3	661,911		
Iowa	267,775	256,314	2	1	1,199,690	1,215,433	11	2	210,352	208,780	4	55	121,406		
Kansas	56,155	56,351	2	3	679,037	678,722	8	1	220,939	177,369	4	11	871,550		
Kentucky	1,049,117	1,047,601	8	1	512,092	512,092	5	1	220,939	177,369	4	11	38,303		
Louisiana	6,965	6,965	2	2	586,220	586,220	8	1	161,835	160,667	4	4	596,832		
Maine	168,250	156,157	2	10	865,387	865,387	2	2	8,680	8,680	4	4	151,353		
Maryland	346,270	335,859	1	1	774,451	773,599	5	2	16,775	16,775	3	8	205,511		
Massachusetts	424,192	417,692	5	3	1,126,450	1,126,450	4	3	763,830	763,830	2	1	878,903		
Minnesota	532,379	532,063	5	3	1,957,013	1,957,013	5	3	313,619	313,619	1	1	675,026		
Mississippi	209,275	209,275	2	2	879,809	879,809	10	2	76,445	76,445	1	8	687,364		
Missouri	120,702	120,702	2	2	1,922,921	1,922,921	10	2	33,708	33,708	2	2	324,111		
Montana	141,519	141,519	2	2	99,778	99,778	1	1	430,255	328,565	2	2	1,015,891		
Nebraska	169,663	169,298	2	1	1,172,608	1,172,608	23	4	18,863	18,863	5	5	1470,663		
Nevada	119,588	119,588	2	4	26,484	26,484	2	2	92,099	92,099	10	10	216,308		
New Hampshire	207,015	199,136	4	1	162,506	162,181	2	2	30,725	30,725	2	2	216,308		
New Jersey	814,982	814,982	4	1	659,133	653,983	3	1	354,985	295,560	1	2	549,223		
New Mexico	2,200,333	2,169,097	2	12	2,206,396	2,062,557	3	9	259,103	252,068	3	1	344,507		
New York	439,955	439,955	2	4	68,342	68,342	3	1	502,615	164,285	3	1	2,446,276		
North Carolina	174,472	173,927	4	4	239,656	236,778	6	3	326,223	326,223	3	1	718,717		
North Dakota	1,203,529	1,204,314	6	1	600,080	587,113	10	2	233,120	233,120	3	2	339,679		
Ohio	167,513	163,718	1	5	2,581,092	2,505,140	6	2	460,050	460,050	3	6	882,128		
Oklahoma	167,513	163,718	1	26	810,316	836,936	6	3	386,134	348,092	3	10	1,103,298		
Oregon	355,255	355,255	4	3	13,187	13,187	1	1	192,766	177,018	2	2	214,101		
Pennsylvania	1,275,304	1,274,976	11	1	3,582,907	3,582,907	17	1	359,074	359,074	2	2	1,316,963		
Rhode Island	205,211	205,211	3	1	3,655	3,655	4	3	307,525	173,851	2	2	176,121		
South Carolina	236,102	223,069	3	8	288,178	286,178	12	1	41,200	41,200	2	2	679,022		
South Dakota	377,953	377,953	10	3	617,122	631,472	12	1	141,200	141,200	2	2	577,760		
Tennessee	301,580	289,686	3	3	1,107,220	1,107,220	6	2	339,126	339,126	1	2	604,287		
Texas	935,706	923,173	12	12	1,660,677	1,618,113	16	2	180,375	168,650	2	2	1,197,994		
Utah	44,955	44,113	2	14	80,738	80,738	1	13	62,710	62,710	24	24	229,177		
Vermont	18,683	18,671	2	4	322,869	293,090	2	3	12,511	12,511	1	4	6,320		
Virginia	92,292	92,292	1	2	778,175	758,515	6	1	967,919	317,919	6	3	576,918		
Washington	170,788	170,788	1	2	222,305	222,305	2	1	8,730	8,730	3	3	132,272		
West Virginia	247,260	241,640	3	6	654,982	654,982	6	1	26,070	26,070	3	3	512,287		
Wisconsin	446,056	417,061	2	31	565,105	561,117	3	2	8,116	8,116	3	3	1,180,235		
Wyoming	477,151	477,150	5	5	1,462	1,462	2	1	273,744	273,744	1	8	281,485		
District of Columbia	2,193	2,193	2	2	214,170	213,655	2	2	11,126	11,126	2	2	5,851		
Hawaii	187,618	187,618	2	2	639,339	639,339	9	9	110,190	110,190	2	2	185,256		
Puerto Rico	103,629	102,980	1	1	37,520,983	35,917,761	267	57	11,294,515	9,489,572	55	20	198,108		
TOTALS	17,304,335	16,819,723	130	41	323	37,520,983	35,917,761	267	57	119	11,294,515	9,489,572	55	20	28,602,577

